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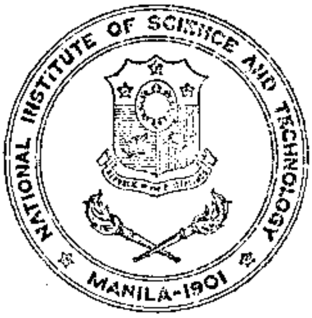
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AN ANNOTATED CHECKLIST OF PHILIPPINE MARINE CHLOROPHYTA *

By WILLIAM J. GILBERT
Albion College, Michigan

ONE PLATE AND ONE TEXT FIGURE

Some years ago the writer published a small group of papers (32, 33, 35, 77) dealing with certain segments of the Philippine marine Chlorophyta. In 1946, he published a review of papers which had appeared before 1940 and which covered Philippine marine Chlorophyta, together with a checklist of species included in these papers.

Aside from these papers, the writer undertook further studies on the green algæ specimens remaining in the collections covered by the same. To date, however, these supplementary studies have never been reported. In line with the current interest in the field of marine phycology in the Philippines, the present checklist has been compiled by combining all important details on the subject available both from those published and unpublished materials.

The collections reported here were studied almost 17 years ago, and it is possible that specimens had been misidentified. Determinations in the families Ulvaceæ and Cladophoraceæ are especially open to question. Of the specimens examined recently in the collection of the University of Michigan Herbarium, a few now bear labels with corrections indicated on the basis of studies made by others. The writer has nevertheless listed these specimens under their original labels, con-

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* The preparation of this paper was supported in part by a grant (G-7107) from the National Science Foundation.

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sidering it not safe to accept such corrections without having studied first the material.

The checklist is arranged systematically by orders and families, but genera and species are arranged alphabetically under the family to which each one belongs. Philippines type locality are preceded by an asterisk, while Philippine species knowingly listed for the first time are preceded by an exclamation point.

CHLOROPHYTA

ULOTRICHALES

ULVACEÆ

ENTEROMORPHA CRINITA (Roth) J. Agardh.

E. crinita (Roth) J. AGARDH (1883) 144; WEBER-VAN BOSSE (1913).

MINDORO, vicinity of Puerto Galera, from a brackish pond at Balatero Malaki, *Velasquez 949, April.*

! ENTEROMORPHA ERECTA (Lyngbye) J. Agardh.

E. erecta (Lyngbye) J. AGARDH (1883) 144.

LUZON, Ilocos Norte Province, Currimao, *Bartlett 14953, 14958,* October; Rizal Province, Parañaque, *Bartlett 16262,* July; Bulacan Province, Hagonoy, *Velasquez 1,* October.

ENTEROMORPHA FLEXUOSA (Wulfen) J. Agardh.

E. flexuosa (Wulfen) J. AGARDH (1883) 126; PICCONE (1886).

BABUYAN, Dalupiri Island, *Bartlett 14616,* July. LUZON, Batangas Province, Nasugbu, Wawa, *Santos 136,* July; South of Manila, Manila Bay, *Ramirez 21,* July. MINDORO, vicinity of Puerto Galera, *Bartlett, 13994,* May; vicinity of Puerto Galera, Batangas Channel, *?14018,* May; near Puerto Galera, Boquete on little Balatero side, *Bartlett 14026,* May; near Puerto Galera, Medio Island, *? Velasquez 785, 791, 792,* April; Mindoro Province, Lubang Island, *Villaflores 49,* September. PALAWAN, Puerto Princesa, Sabang, St. Paul's Bay, *? Santos 674,* April. MINDANAO, opposite Zamboanga, Lagoon of Big Santa Cruz Island, *Bartlett A–46,* January to February; Zamboanga, near Philippine Desiccated Coconut Factory, *Bartlett A–94,* January to February. BASILAN, Lanhil (Little Sibago) Island (at east entrance to Strait of Basilan), *Balhani 151,* January to February; east coast of Basilan Island, southwest of Matangal Point, Takut Tangug Bay, Sangig, *Balhani 771,* January to February.

ENTEROMORPHA INTESTINALIS (L.) Link.

E. intestinalis (L.) LINK (1820) 5.

Ulva intestinalis BLANCO (1837); MERRILL (1918).

BABUYAN, Dalupiri Island, *Bartlett 14996*, October to November. LUZON, Manila Bay, *Merrill 7459*, January to February; Quezon (Tayabas) Province, *Bur. For. 11131 Curran*, April. MINDORO, near Puerto Galera, *Bartlett 13952, 13989*, May.

ENTEROMORPHA LINGULATA J. Agardh.

E. Lingulata J. AGARDH (1883) 143; HOWE (1932).

LUZON, Ilocos Sur Province, *Kalaw 8*, June; Quezon (Tayabas) Province, Baler, Digisit, *Santos 428*, September. BASILAN, southwest of Matangal Point, Takut Tangug Bay, Bojelebung, *Balhani 801*, January to February.

ENTEROMORPHA PLUMOSA Kützing.

E. plumosa KÜTZING (1843) 300, Plate 20, fig. 1.

Albatross Expedition 85.

ENTEROMORPHA PROLIFERA (Mueller) J. Agardh.

E. prolifera (Mueller) J. AGARDH (1883) 129, Plate 4, figs. 103, 104; MERRILL (1918).

LUZON, Ilocos Sur Province, Narvacan Beach, *Kalaw 2*, June; Manila Bay, *Merrill 4113*, April. MINDANAO, southeast of Zamboanga, Tabtabon (Tictavon) Island, *Balhani 136*, January to February. *Albatross Expedition 73.*

! ENTEROMORPHA TUBULOSA Kützing.

E. tubulosa KÜTZING, Tab. Phyc. 6 (1856) 11, Plate 32, fig. 2.

LUZON, Rizal Province, Pasay, *Bartlett 16260*, July; Quezon (Tayabas) Province, Mauban, Barrio Halopag, *Pastrana 19*, September. MINDORO, Mindoro Province, Lubang Island, *Villaflores 50*, September. PALAWAN, Puerto Princesa, Buenavista, *Santos 660*, April.

! MONOSTROMA NITIDUM Wittrock.

M. nitidum WITTROCK (1866) 41, Plate 2, fig. 7.

MINDORO, vicinity of Puerto Galera, *Bartlett 13995*, May; near Puerto Galera, Medio Island, *Velasquez 786*, April. PALAWAN, Taytay, *Merrill 9157*, April.

! ULVA FASCIATA Delile.

U. fasciata DELILE (1813) 153, Plate 58, fig. 5.

SULU, Jolo Island, Harbor of Jolo, *Bartlett 16046, 16047, 16048.*

ULVA LACTUCA Linnæus.

U. lactuca LINNAEUS (1753) 1163; WEBER-VAN BOSSE (1913).

BABUYAN, Dalupiri Island, *Bartlett 15023*, October to November. LUZON, Cagayan Province, *Bur. For. 16796 Curran*, March; South of Manila Bay, *Ramirez 1, 5*, June; Manila Bay, *Merrill 7457*, January to February. MINDORO, vicinity of Puerto Galera, *Bartlett 13996*, May; near Puerto Galera, on little Balatero side, *Bartlett 14030*, May; vicinity of Puerto Galera, Varadero Bay, near Boaya Point, *Velasquez 813*, May; vicinity of Puerto Galera, San Teodoro Municipality, *Velasquez 1038*, April. PALAWAN, Puerto Princesa, St. Paul's Bay, *Santos 677*, April. MINDANAO, opposite Zamboanga, Lagoon of Big Santa Cruz Island, *Bartlett A–47*, January to February; Zamboanga, near Philippine Desiccated Coconut Factory, January to February, *Bartlett A–92*, January to February; opposite Zamboanga, Little Santa Cruz Island, *Bartlett A–191*, January to February; southeast of Zamboanga, Tabtabon (Tictavon) Island, *Balhani 137*, January to February. BASILAN, Lanhil (Little Sibago) Island (at east entrance to Strait of Basilan), *Balhani 152*, January to February; Tengolan (Teingolan) Island (west of Malusa Bay, Basilan Island), January to February. *Albatross Expedition 50, 57.*

ULVA RETICULATA Forsskål.

U. reticulata FORSSKÅL (1775) 187; MONTAGNE (1844); MARTENS (1866); DICKIE (1876); PICCONE (1886); WEBER-VAN BOSSE (1913).

CEBU, east coast of Cebu Island, 18 km northeast of Cebu, Liloan Beach, *Bartlett 16204*, September. MINDANAO, opposite Zamboanga, Lagoon of Big Santa Cruz Island, *Bartlett A–48*, January to February; Zamboanga, near Philippine Dessicated Coconut Factory, *Bartlett A–93*, January to February; southeast of Zamboanga, Tabtabon (Tictavon) Island, *Balhani 138*, January to February. BASILAN, Lanhil (Little Sibago) Island (at east entrance to Strait of Basilan), *Balhani 153*, January to February. MINDANAO, northwest of Zamboanga, Baliwasan (Baliuasan), *Balhani 211*, January to February; west of Basilan Strait, 30 miles west-northwest of Isabela de Basilan, Sangboy Islands, *Balhani 231*, January to February; Zamboanga Province, near Moro community, Bilang-bilang, *Balhani 306*, January to February; 20 miles northwest of Zamboanga, Labuan, *Balhani 421*, January to February; Zamboanga Province, Pangapuan (Pagapuan) Island, Bavara, *Balhani 466*, January to February. BASILAN, east coast of Basilan Island, southwest of Punta Matangal, beyond Sikeang, Kapago, *Balhani 601,* January to February; west of Isabela de Basilan, Panigayan Island, *Balhani 626,* January to February. MINDANAO, Zamboanga Province, Sibakel Island, *Balhani 647,* January to February. BASILAN, west of Basilan Island, east of Pilas Island, Balukbaluk Island, *Balhani 731, 732,* January to February, due south of Cabenbeng, Saluping (Salipin) Island, *Balhani 871,* January to February. *Albatross Expedition 59, 64,* January to February.

SIPHONOCLADIALES

VALONIACEÆ

DICTYOSPHAERIA CAVERNOSA (Forsskål) Börgesen.

D. cavernosa (Forsskål) BÖRGESEN (1932) 2, Plate 1, fig. 1.
D. favulosa DICKIE (1876).

BABUYAN, Dalupiri Island, Bartlett *15021,* October to November; Dalupiri Island, *Bartlett 16250,* July. MINDORO, Puerto Galera, *Bartlett 13960,* May; Batangas Channel, *Bartlett 14615,* July; west Shore of Muelle, near Puerto Galera, *Velasquez 749,* March, vicinity of Puerto Galera; Balatero Maliit, *Velasquez 764,* April; vicinity of Puerto Galera, Medio Island, *Velasquez 852,* April; vicinity of Puerto Galera, Muelle, *Velasquez 852a,* April; Sabang, near Puerto Galera, *Velasquez 1055,* April. PALAWAN, Taytay, *Merrill 9145,* April; Puerto Princesa, Marapinas, St. Paul's Bay, *Santos 703,* April. BASILAN, north coast of Basilan Island, near Malamaui, Atong-atong, *Balhani 68,* January to February. MINDANAO, northeast of Zamboanga, Sakul Island, Landang, *Balhani 107,* January to February; Zamboanga Province, Pangapuyon Island, *Balhani 172,* January to February. BASILAN, 30 miles west-northwest of Isabela de Basilan, west of Basilan Strait, Sangboy Islands, *Balhani 233,* January to February. MINDANAO, Zamboanga, Calarian (Kaladian) near army post, *Balhani 253,* January to February; 19 miles north-northeast of Zamboanga, Sangali, near Bolong, *Balhani 271,* January to February; southeast of Zamboanga, Punta Mariki, *Balhani 367,* January to February; northeast of Zamboanga, Babag, near Taluksangay, *Balhani 402,* January to February; southeast of Zamboanga beyond Marike, Logoy, near Moro cemetery, *Balhani 437,* January to February. BASILAN, northeast coast of Basilan

Island, Sumut, near Lamutan *Balhani 522,* January to February; Toburan, *Balhani 542,* January to February; east point of Basilan Island, Punta Matangal, *Balhani 564,* January to February; west of Isabela de Basilan, Panigayon Islands, *Balhani 630,* January to February; off the west coast of Basilan Island, Kilay (Langasmati) Island near Langas Island, *Balhani 696,* January to February; Bagbagon, near Basilan point, *Balhani 713,* January to February.

! DICTYOSPHAERIA SETCHELLII Börgesen.

D. setchellii BÖRGESEN (1940) 12, fig. 1.

BASILAN, west of Basilan Strait, 30 miles west-northwest of Isabela de Basilan, Sangboy Island, *Balhani 230,* January to February.

! VALONIA AEGAGROPILA C. Agardh.

V. ægagropila C. Agardh (1822) 429.

PALAWAN, Puerto Princesa, Marapinas, St. Paul's Bay, *Santos 704,* April. BASILAN, north coast of Basilan Island, near Malamaui, Atong-atong, *Balhani 59,* January to February. MINDANAO, northeast of Zamboanga, Sakul Island, Landang, *Balhani 110,* January to February; Zamboanga Province, Pangapuyon (Pangapuan) Island, *Balhani 174,* January to February. BASILAN, 30 miles west-northwest of Isabela de Basilan, west of Basilan Strait, Sangboy Islands, *Balhani 234,* January to February. MINDANAO, Zamboanga, Calarian, near Army Post, *Balhani 252,* January to February; Zamboanga Province, Cabuluay, near Cabaluay River, *Balhani 287, 289,* January to February; northwest of Zamboanga, near Caldera Bay, at kilometer 13 on shore road, Sinunug, *Balhani 351,* January to February; southwest of Zamboanga, Punta Mariki, *Balhani 495,* January to February. BASILAN west of Isabela de Basilan near Taluksangay, *Balhani 405, 406,* January to February; southeast of Zamboanga beyond Mariki, Logoy, near Moro cemetery, *Balhani 439,* January to February; northwest of Zamboanga, beyond the Baliwasan River, Gavilan Point, near Campo Islam, *Balhani 453,* January to February; 22 miles northeast of Zamboanga, near Panubigan Islands, Buenavista, *Balhani 481,* January to February; 22 miles northeast of Zamboanga, Panubigan (Panubijan) Islands, *Balhini 493,* January to February; 18 miles northeast of Zamboanga, near Bolong, Badlak, *Balhani 507, January to February.* BASILAN, northeast coast of Basilan Island, near Lamitan, Sumut (Summot), *Balhani*

518, 520, January to February; Toburan, *Balhani 544,* January to February; east point of Basilan Island, Punta Matangal, *Balhani 565,* January to February. MINDANAO, Zamboanga Province, Sibakel Island, *Balhani 651,* January to February. SULU, Siasi Island, south of Siasi, *Bartlett 16028,* September. *Albatross Expedition 58.*

This writer has studied the frequency of the occurence of *Valonia ægagropila* from the collections made in the Philippines and the absence of *V. utricularis,* a species which is often confused with *V. ægagropila* and reported from the Philippines by several authors, is difficult to explain. Although he feels that *V. utricularis* may be found in this region, he is of the opinion that a considerable number of the reports of that species from this area are a result of incorrect determinations. It is quite obvious from the drawings of the plants reported as *V. utricularis* from the Ryukyo Islands by Yamada [(1934) 37, fig. 3] and Okamura [(1936) 33, fig. 15] that they were not dealing with that species, but more likely with either *V. fastigiata* or *V. ægagropila.* As described by C. Agardh [(1822) 429] and by more recent workers, especially Kuckuck [(1907) 166], *V. utricularis* is a plant that is simple or only sparingly branched, not like the abundantly branched, more massive plants represented by the figures of Yamada and Okamura as cited above.

VALONIA FASTIGIATA Harvey.

V. fastigiata HARVEY, Alg. Ceylon *exsicc. 74;* DICKIE (1876); WEBER-VAN BOSSE (1913).

MINDORO, vicinity of Puerto Galera, Varadero Bay, Balete, *Velasquez 1019,* April. MINDANAO, southwest of Zamboanga, Little Santa Cruz Island, in Basilan Strait, *Bartlett 16136,* September; opposite Zamboanga, Lagoon of Big Santa Cruz Island, *Bartlett A–45,* January to February. BASILAN, Punta Mangal, *Ebalo A–24,* January; north coast of Basilan Island, near Malamaui, Atong-atong, *Balhani 60,* January to February. MINDANAO, southeast of Zamboanga, Tabtabon (Tictavon) Island, *Balhani 140,* January to February; Zamboanga Province, Pangapuyon (Pagapuan) Island, *Balhani 176,* January to February; Zamboanga Province, near mouth of Cabaluay River, Cabaluay, *Balhani 213, 286,* January to February; Zamboanga Province, near Moro community, Bilang-bilang, *Balhani 308,* January to February. BASILAN, northeast coast of Basilan

Island, near Lamitan, Balas (Nipa Balas), *Balhani 323*, January to February; Isabela Channel, near the lighthouse, Tundun Pasil, *Balhani 336*, January to February. MINDANAO, 15 miles northeast of Zamboanga, Manicaan, *Balhani 385*, January to February; 20 miles northwest of Zamboanga, Labuan, *Balhani 424*, January to February; Zamboanga Province, Pangapuyan Island, Bavara, *Balhani 469*, January to February; 22 miles northeast of Zamboanga, Panubigan (Panubijan) Island, *Balhani 494*, January to February. BASILAN, northeast coast of Basilan Island, near Lamitan, Sumut, *Balhani 519*, January to February; Toburan, *Balhani 543*, January to February; east coast of Basilan Island, southwest of Punta Matangal, Sikeang, *Balhani 587*, January to February; east coast of Basilan Island, southwest of Punta Matangal, Kapago, beyond Sikeang, *Balhani 602*, January to February; Tengolan (Teingalon) Island (west of Malusa Bay, Basilan Island), *Balhani 680*, January to February; southwest of Matangal Point, Takut Tangug Bay, Bojelabung, *Balhani 803*, January to February. SULU, Siasi Island, north of Siasi, *Bartlett 16038*, September.

In most of the collections above the tenacula do not seem to be laciniate at their apices as reported by J. Agardh [(1886) 101, Plate 1, fig. 5], but instead the apical anastomosing membranes are more or less smooth or crenellate.

VALONIA MACROPHYSA Kützing.

V. macrophysa KÜTZING (1843) 307; Martens (1866).

VALONIA UTRICULARIS (Roth) C. Agardh.

V. utricularis (Roth) C. AGARDH (1822) 431; MARTENS (1886); DICKIE (1876); WEBER-VAN BOSSE (1913).

SIPHONOCLADACEÆ

!BOERGESENIA FORBESII (Harvey) Feldmann.

B. forbesii (Harvey) FELDMANN (1938) 1503.

LUZON, Ilocos Norte Province, Currimao, *Bartlett 14972, 14973*, October. MINDORO, Lubang Island, *Villaflores 17*, September. PALAWAN, Puerto Princesa, Buenavista, *Santos 647*, April. MINDANAO, near Zamboanga, in Basilan Strait, Little Santa Cruz Island, *Bartlett 16157*, September; opposite Zamboanga, Little Santa Cruz Island, *Bartlett A–194*, January to February. BASILAN, north coast of Basilan Island, near Malamaui, Atong-atong, *Balhani 58*, January to February. MINDANAO, northeast of Zamboanga, Sakul Island, Landang, *Balhani 109,* January to February; Zamboanga Province, Pangapuyon (Pagapuan) Island, *Balhani 175,* January to February; 19 miles north-northeast of Zamboanga, near Bolong, Sangali, *Balhani 272,* January to February; 15 miles northeast of Zamboanga, Manucaan, *Balhani 384,* January to February; 22 miles northeast of Zamboanga, Panubigan Islands, *Balhani 495,* January to February. BASILAN, west of Isabela de Basilan, Panigayan (Panegayon) Islands, *Balhani 629,* January to February; east point of Basilan Island, near Punta Matangal Boboh, *Balhani 749,* January to February. *Albatross Expedition 70.*

! STRUVEA DELICATULA Kützing.

S. delicatula KÜTZING, Tab. Phyc. 16 (1866) 1, Plate 2.

MINDANAO, Zamboanga Province, Calarian (Kaladian), near Army Post, *Balhani 268,* January to February; northwest of Zamboanga, near Caldera Bay, at kilometer 13 on shore road, Sinunug; *Balhani 365a,* January to February. BASILAN, east point of Basilan Island, near Punta Matangal, Boboh, *Balhani 747,* January to February.

It is interesting to note in this species that in the largest fronds, especially if the stipe is not conspicuous, the general aspect assumes much the same character as fronds of *Microdictyon montagnei* Harvey, but separation can usually be made on the basis of the more slender, somewhat fastigiate branches that are never produced in more than one plane in *Struvea delicatula,* in contrast with the somewhat broader, opposite branches that are often produced in more than one plane in *Microdictyon montagnei.*

BOODLEACEÆ

! BOODLEA COMPOSITA (Harvey) Brand.

B. composita (Harvey) BRAND (1905) 187, Plate 6, figs. 28–35.

BATANES, Batan Island, beach at Basco, *Bartlett 15401,* July. BABUYAN, Dalupiri Island, *Bartlett 14610,* July; Dalupiri Island, *Bartlett 14997,* October to November. LUZON, Ilocos Sur Province, Narvacan Beach, *Kalaw 5,* June; Batangas Province, Nasugbu, Wawa, *Santos 116,* July. MINDORO, Mindoro Province, Lubang Island, *Villaflores 45,* September; vicinity of Puerto Galera, *Bartlett 14012, 14032b,* May; near Puerto Galera, Paniquian Island, *Velasquez 832;* near Puerto Galera, Medio Island, *Velasquez 855,* April. CALAMIAN, Culion Island, Culion Harbor, *Bartlett 15601,* July. PALAWAN, Puerto Princesa, Buenavista, *Santos 654,* April. MINDANAO, northeast of Zamboanga, near Taluk-sangay, Babag, *Balhani 403,* January to February. BASILAN, west of Malusa Bay, Tengolan (Teingolan) Island, *Balhani 678,* January to February; off the west coast of Basilan, near Langas Island, (Kilay Langasmati) Island, *Balhani 734,* January to February; south coast of Basilan Island, Sittio Pohu, *Balhani 826,* January to February. SULU, between Lapak Island and Tagtagan Island, Siasi Island, south of Siasi, *Bartlett 16030, 16031,* September. *Albatross Expedition 59.*

The thalli found in the above collections are in the form of expanded cushions that are sometimes several centimeters across. Within the cushion the branching is very irregular and in all planes with the primary branches up to 350 broad and the segments as much as 10 diameters long, although usually less; branching in the outer parts of the frond is abundant and either irregular or with a tendency to be unilateral, the branches and axis curving, or (in some instances often) the branching may be quite regularly opposite, the branches then assuming a *struvea*-like appearance. The terminal cells are 50 to 80 broad and they are from 3 to 23, although usually only 3 to 5, diameters long. It appears to be from the extremely long cells that the pinnate or *struvea*-like structures are formed. Tenacula are common, especially in the interior of the frond, and are almost always formed at the tips of the cells. Occasionally rhizoids are formed at the tips of branches.

MICRODICTYON MONTAGNEI Harvey ex J. E. Gray.* Fig. 1, a-c.

M. Montagnei HARVEY ex J. E. GRAY (1866) 69.

BASILAN, Little Santa Cruz Island, *Bartlett 16143,* September. MINDANAO, Zamboanga, Calarian (Kaladian) near Army Post, *Balhani 254,* January to February; Zamboanga Province, near mouth of Cabaluay River, Cabaluay, *Balhani 288,* January to February. BASILAN, northeast of Basilan Island, Balas (Nipa Balas) near Lamitan, *Balhani 321,* January to February. MIN-

* *Boodlea montagnei* (Harvey ex J. E. Gray) Egerod (1952) 332. Mrs. Egerod includes the genus *Microdictyon* under the family Anadyomenaceæ but excludes *Microdictyon montagnei* Harvey ex J. E. Gray transferring it to be genus *Boodlea* on the basis of "the characteristic attachment cells that Murray and Boodle . . . first called tenaculæ . . . (and) on other counts as well."

DANAO, southeast of Zamboanga, Punta Mariki, *Balhani 368*, January to February; 15 miles northeast of Zamboanga, Manicaan, *Balhani 382*, January to February; Zamboanga Province, Pangapuyan Island, Bavara, *Balhani 468*, January to February; 22 miles northeast of Zamboanga, Panubigan Islands, *Balhani 492*, January to February. BASILAN, east point of Basilan Islands, Punta Matangal, *Balhani 563*, January to February. MINDANAO, Zamboanga Province, Sibakel Island, *Balhani 650*, January to February. BASILAN, east point of Basilan Island, near Punta Matangal, Boboh, *Balhani 748*, January to February; south coast of Basilan Island, Tanusa, *Balhani 826*, January to February.

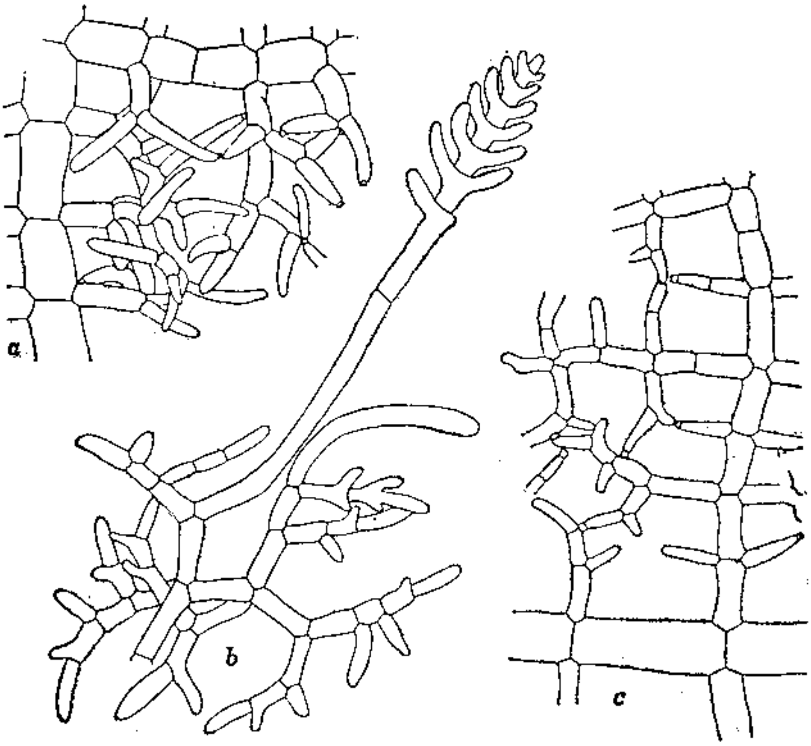

FIG. 1. *Microdictyon montagnei* Harvey: *a*, Portion of the thallus showing the tendency of smaller branches to be in more than one plane; *b*, one of the rare *Struvea*-like branches originating from a *Boodlea*-like part of the thallus near the outer margin of the more or less flat frond; *c*, a portion of the flat part of the same frond from which *b* was drawn. All × 15.

This is another species which proves to be extremely variable, so that its limits are difficult to define. As pointed out by Reinbold [in Weber-van Bosse (1913) 68, 73] and Setchell [(1929) 567–679], at times there is a great similarity to form of *Boodlea,* especially in the marginal parts of the fronds where branching often occurs in more than one plane. This is also true of the specimens cited above, and unless one has the whole frond to study it is sometimes most difficult to separate it from *B. composita,* for often it is only in the areas around the principal veins that the branching is found in one plane as characteristic in *Microdictyon.* More rarely in all or part of a frond the cells may be quite regularly short, with the branching of filaments generally alternate, or when opposite the pair of branches are unequal in development, so that in appearance the similarity to Reinbold's figure of *Boodlea paradoxa* is striking [cf. Reinbold, in Weber-van Bosse (1913) 73, fig. 12] and suggests that *B. paradoxa* may be only a growth form of *Microdictyon montagnei.*

Still another direction of variation in the branching of *Microdictyon montagnei* is found in *Balhani 386.* Occasionally around the edges or periphery of the fronds in the specimens of this collection are found very much elongated, more or less erect cells, which branch at their upper ends in a *struvea*-like fashion, much the same condition as found in some of the specimens of *Boodlea composita* mentioned previously. It will be noted from much the same condition as found in some of the specimens of frond giving rise to these *struvea*-like branches is *boodlea*-like in character, but as one progresses inward in the frond toward the principal veins, the branching gradually passes into the flat aspect characteristic of the genus *Microdictyon* (cf. Fig. 1, c, which was drawn from the inner area of the same frond from which Fig. 1, b was made). Here, then in a single specimen, is represented characters of three different genera that are seemingly distinct when seen in their "typical" form.

! SPONGOCLADIA VAUCHERIAEFORMIS Areschoug.

S. voucheriaeformis ARESCHOUG (1853) 201.

MINDORO, Mindoro Province, Lubang Island, *Villaflores 37,* September. SULU, Jolo Island, harbor of Jolo, *Bartlett 16049,* September.

CLADOPHOROPSIS SUNDANENSIS Reinbold.

C. sundanensis REINBOLD (1905) 147; WEBER-VAN BOSSE (1913).

ANADYOMENACEÆ

***! ANADYOMENE ESEPTATA Gilbert, sp. nov.** Plate 1, figs. 1–6.

Frondes rosulatæ, caespitosae, 2–2.5 cm altae, substrato rhizoideis irregularieter ramosis adfixae, margine crenulatae vel lobatae, venis numerosis, subcylindricis vel clavatis, 125–150 latis in fronde matura, nonseptatis inter dichotomias, flabelliformiter ramosis, ramis 5–7 propinquis sed solum duobus (raro 1 vel 3) iterum ramosis; interstitiis angustissimis, cellulis secondariis bistratis vel tristratis, interstitum solide tenentibus, in parte frondis superiore parvis rotundatis vel polygonis vel paulum elongatis, margines venorum paulum obtegentibus, in partibus frondium intermediis inferioribusque iisdem cellulis grandiusculis, rotundatopolygonis vel elongatis, obvie venas obtegentibus, saepe in appendices rhizoidales simplices vel furcatas productis, appandicibus transverse vel obliquiter versus venas repentibus, corticatione solum completa in parte frondis inferiore.

Type specimen: *H.H. Bartlett 15031*, ex Dalupiri Island, Babuyan Group, Cagayan Province, Philippines, October 31 to November 5, 1935, in the Herbarium of the University of Michigan.

The fronds are rosulate-cespitose, reaching 2 to 2.5 cm in height, with a crenulate or lobed margin, attached to the substratum by more or less irregularly branched, septate rhizoids descending from the lower cells. The primary cells or veins are numerous, subcylindrical or clavte, without septa between the branches. These primary cells branch flabellately at their tips into 5 to 7 daughter cells, two (rarely one or three) of which develop strongly and form main veins (cf. Plate 1, figs. 1–3). Branching of the veins is not divergent, remaining more or less closed, so that the veins lie close together, thus leaving the interstitial spaces narrow. In the older parts of the frond the veins reach 125 to 150 diameter, with a distance of as much as 2.3 mm between successive branches, this distance becoming progressively shorter towards the margins of the frond. Successive polychotomies of the principal veins takes place at such equal distances from the point of attachment that the branches lend the thallus an inconspicuous zonate appearance. Rhizoids descent from the proximal end of many of the segments of the main veins in the lower portion of the frond. The secondary or interstitial cells two or three layers thick (cf. Plate 1, fig. 4); in the upper part of the frond they are small, roundish-polygonal or somewhat elongate, completely filling the interstices and slightly overlapping the margins of the veins (cf. Plate 1, fig. 5); in the middle and lower parts of the frond the interstitial cells are somewhat larger, roundish-polygonal to elongate, completely filling the interstices and markedly overlapping the veins, many of them elongated transversely and often prolonged into a simple or-furcate, rhizoidal-like process that extends transversely or obliquely on to or across the veins, forming a sort of pseudo-cortex (cf. Plate 1, fig. 6). Cortication completely covering the veins is found only in the basal parts of the plant.

Materials identified: *Bartlett 15031*, type, from Dalupiri Island, Babuyan Group, Philippines, October 31 to November 5, 1935, in the Herbarium of the University of Michigan.

This newly proposed *Anadyomene* possesses two characters which are easily recognizable and which set it apart from all previously described species of the genus. In *Anadyomene eseptata* there is a complete absence of transverse walls in the veins between successive branches. In other known species transverse walls are present, dividing the principal veins into two or more segments between successive polychotomies. The second distinctive character has to do with the arrangement of veins. In *Anadyomene eseptata* generally two (rarely one or three) of the five to seven daughter cells formed in the flabellate branching of the veins develop strongly into main veins, but instead of being rather divergent as in other species of *Anadyomene* the branching is almost closed so that these principal veins lie close to one another, sometimes being almost parallel, leaving the interstitial spaces quite narrow. The numerous, almost parallel, somewhat crowded veins are easily seen by the unaided eye and serve as an excellent diagnostic character. The absence of transverse walls in the veins between the branches can only be noted after considerable magnification. Because the veins are so little divergent and since the branching apparently takes place at rather regular intervals, the frond appears inconspicuously zonate.

In addition to the points above, the partial to complete cortication of *Anadyomene eseptata*, especially in the middle and lower parts of the frond differs from the condition in *A. wrightii* Gray and *A. stellata* (Wulfen) C. Agardh which are uncorticated throughout save for a slight overlapping of the veins by the interstitial cells. It further differs from *A. stellata* in which five to seven veins develop strongly at each branching of the veins instead of the two (rarely one or three) so characteristic of *A. eseptata.* The latter also almost completely lacks the rather strongly developed, transversely elongate secondary cells that are arranged in ladderlike fashion and which quite regularly appear in the interstices between the veins of *A. stellata.*

From *Anadyomene plicata* C. Agardh and *A. brownii* Gray the proposed species differs principally in the two characters mentioned previously regarding the arrangement of the branches of veins and the absence of transverse walls between successive vein polychotomies.

This leaves for comparison with *Anadyomene eseptata* only *A. leclancherii* Decaisne [(1844) 236]. The latter species, which has been reported from the Sulu Archipelago, is characterized by a reticulate frond, the meshes of which occur in the interstices between the veins, this standing in sharp contrast with the plain frond of *A. eseptata* and other species of the genus. A figure of *A. leclancherii* [under *Microdictyon clathratum* Martens (1866) 25, Plate 4, fig. 1] shows the veins uncorticated and widely divergent, being divided into segments between the polychotomies, which in addition to the meshes in the interstices separate it from *A. eseptata.*

ANADYOMENE LECLANCHERII Decaisne.

A. *leclancherii* DECAISNE (1844) 236.
Microdictyon clathratum MARTENS (1866).
Cystodictyon leclancherii GRAY (1866).

ANADYOMENE PLICATA C. Agarh.

A. *plicata* C. AGARDH (1822) 400.

LUZON, Zambales Province, Santa Cruz, *Bartlett 14151,* May. MINDORO, Mindoro Province, Lubang Island, *Villaflores 35,* September. PALAWAN, Puerto Princesa, Sabang, St. Paul's Bay, *Santos 683,* April.

ANADYOMENE STELLATA (Wulfen) C. Agarh.

A. *stellata* (Wulfen) C. AGARDH (1822) 400.
A. *flabellata* DICKIE (1876).

This report is to be seriously questioned inasmuch as *A. stellata* seems to be restricted chiefly to the West Indies.

! ANADYOMENE WRIGHTII Gray.

A. *wrightii* GRAY (1866) 48, Plate 44, fig. 5.

Albatross Expedition 75.

!VALONIOPSIS PACHYNEMA (Martens) Börgesen.

V. *pachynema* (Martens) BÖRGESEN (1934) 10, figs. 1, 2.

BABUYAN, Dalupiri Island, *Bartlett 15027*, October to November. LUZON, La Union Province, San Fernando, Puro, *Bur. Sci. 13007 Fénix*, December. MINDORO, Puerto Galera Bay, *Bartlett 13779*, May. MINDANAO, opposite Zamboange, Little Santa Cruz Island, *Bartlett A–195*, January to February. BASILAN, north coast of Basilan Island, near Malamaui, Atong-atong, *Balhani 57*, January to February. MINDANAO, northeast of Zamboanga, Sakul Island, Landang, *Balhani 108*, January to February. BASILAN, at east entrance to Strait of Basilan, Sibago Island, *Balhani 122*, January to February. MINDANAO, Zamboanga Province, Pangapuyon (Pagapuan) Island, *Balhani 173*, January to February; 19 miles north-northeast of Zamboanga, Sangali near Botong, *Balhani 273*, January to February. BASILAN, northeast coast of Basilan Island, Balas (Nipa Balas) near Lamitan, *Balhani 322*, January to February; Isabela Channel, Tundun Pasil near the lighthouse, *Balhani 337*, January to February. MINDANAO, southeast of Zamboanga, Punta Mariki, *Balhani 369*, January to February; 15 miles northeast of Zamboanga, Manicaan, *Balhani 383*, January to February; northeast of Zamboanga, near Taluksangay, Babag, *Balhani 404*, January to February; southeast of Zamboanga, beyond Marike, Logoy near Moro cemetery, *Balhani 438*, January to February; northwest of Zamboanga, beyond the Baliwasan River, near Campo Islam, Gavilan Point, *Balhani 452*, January to February; 22 miles northeast of Zamboanga, Buenavista near Panubigan Islands, *Balhani 482*, January to February; 22 miles northeast of Zamboanga, Panubigan (Panubijan) Islands, *Balhani 496*, January to February; 18 miles northeast of Zamboanga, near Bolong, Badlak, *Balhani 506*, January to February. BASILAN, northeast coast of Basilan Island, near Lamitan, Sumut (Summot), *Balhani 521*, January to February; east point of Basilan Island, Punta Matangal, *Balhani 571*, January to February; west of Isabela de Basilan, Panigayan Islands, *Balhani 628*, January to February. MIN-

DANAO, Zamboanga Province, Sibakel Island, *Balhani 652,* January to February. BASILAN, off the west coast of Basilan Island, near Langas Island, Kilay (Langasmati) Island, *Balhani 697,* January to February.

CLADOPHORACEÆ

!CLADOPHORA AOKII Yamada.

C. aokii YAMADA (1925) 85, fig. 3.

LUZON, Bataan Province, Limay, *Shaw 1106,* May.

! CLADOPHORA FASCICULARIS (Mertens) Kützing.

C. fascicularis (Mertens) Kützing (1843) 263.

LUZON, Ilocos Norte Province, Currimao, *Bartlett 14971b,* October; Manila, *Bur. Sci. 6103* Robinson, April. MINDANAO, opposite Zamboanga, Lagoon of Big Santa Cruz Island, *Bartlett A–43,* January to February; Zamboanga, near Philippine Desiccated Coconut Factory, *Bartlett A–97,* January to February. BASILAN, Lanhil (Little Sibago) Island (at east entrance to Strait of Basilan); January to February. MINDANAO, 20 miles northwest of Zamboanga, Labuan, *Balhani 423,* January to February; Zamboanga Province, Sibakel Island, *Balhani 649,* January to February.

! CLADOPHORA FULIGINOSA Kützing.

C. fuliginosa KÜTZING (1849) 515.

BABUYAN, Dalupiri Island, *Bartlett 15026, 15037b,* October to November.

As so often reported, the specimens at hand of this species are infected with a fungus, probably *Blodgettia borneti* Wright. The frequency of this fungus in *Cladophora fuliginosa* would seem to indicate that they may not exist independently, but the relationship between the fungus and alga is not known.

? CLADOPHORA MAURITIANA Kützing.

C. mauritiana KÜTZING (1849) 399; DICKIE (1876).

This is the only known report for *C. mauritiana* from the Indian Ocean, and Dickie's report is therefore questionable, especially since it is accompanied by a description.

CLADOPHORA PELLUCIDA (Hudson) Kützing.

C. pellucida (Hudson) KÜTZING (1845) 208; MONTAGNE (1844).

! RHIZOCLONIUM KERNERI Stockmayer.

R. kerneri STOCKMAYER (1890) 582.

LUZON, Laguna Province, vicinity of Muntinlupa, Laguna Bay, *Ramirez 27*, August, in brackish water.

This species is closely related to *Rhizoclonium kochianum* Kützing which is thought by some to be identical. The material at hand is quite constant in having wider filaments and segments that are regularly longer for their width than those of *R. kochianum*, so for the present it is thought best to keep the two separately.

! RHIZOCLONIUM SETACEUM Kützing.

R. setaceum KÜTZING (1847) 166.

LUZON, Bataan Province, Lamao, *Merrill 3516*, October.

! CHAETOMORPHA ANTENNINA (Bory) Kützing.

C. antennina (Bory) KÜTZING (1849) 379.

LUZON, Quezon (Tayabas) Province, Piapi, *Bur. For. 9559 Curran*, March; Alabat Island, *Merrill 10586*, December.

In studying the material described above, the writer has come to believe with Börgesen [(1940) 38] that *Chaetomorpha antennina* (Bory) Kützing and *C. media* (C. Agardh) Kützing are the same species. He has found the same type of condition that Börgesen mentions, in which there are basal cells of a length which would be characteristic of either species, and also lengths that are intermediate between these two. Inasmuch as in other characters beside the length of the basal cell there is little if anything to distinguish *C. antennina* and *C. media* as separate species there seems to be no reason for keeping them distinct. Characteristic of the Philippine material also is a very thick and much stratified wall in the basal cells and, as pointed out by Börgesen for the species, the basal cell does not become longer by growing through the cells above as in several other species of *Chaetomorpha*.

! CHAETOMORPHA BRACHYGONA Harvey.

C. brachygona HARVEY (1858), Ner. Bor.-Amer., Pt. 3 (1858) 87, Plate 46–A, figs. 1–2.

LUZON, Manila and vicinity, *Merrill 7456b*, January to February.

This species is easily recognized by its small diameter and the regular shortness of the segments, along with the moderately thin cell membrane.

! CHAETOMORPHA CRASSA (C. Agardh) Kützing.

C. crassa (C. Agardh) Kützing (1845) 204.

BABUYAN, Dalupiri Island, *Bartlett 14611,* July; Dalupiri Island, *Bartlett 15025,* October to November. LUZON, Ilocos Norte Province, Currimao, *Bartlett 14970,* October; La Union Province, San Fernando, Puro, on reef, *Bur. Sci. 13012 Fénix,* December; Manila and vicinity, *Merrill 7456,* January to February. MINDORO, Mindoro Province, Lubang Island, *Villaflores 10, 10a,* September. PALAWAN, Puerto Princesa, Buenavista, *Santos 652, 667,* April. LUZON, Albay Province, Albay, *Bur. For. 12264 Curran.* MINDANAO, near Zamboanga, Basilan Strait, Little Santa Cruz Island, *Bartlett 16141,* September; opposite Zamboanga, Lagoon of Big Santa Cruz Island, *Bartlett A–44,* January to February; Zamboanga, near Philippine Desiccated Coconut Factory, *Bartlett A–96,* January to February. BASILAN, north coast of Basilan Island, near Malamaui, Atongatong, *Balhani 56,* January to February. MINDANAO, northeast of Zamboanga, Sakul Island, Landang, *Balhani 106,* January to February. BASILAN, Sibago Island (at east entrance to Strait of Basilan), *Balhani 121,* January to February. MINDANAO, southeast of Zamboanga, Tabtaban (Tictavon) Island, *Balhani 139,* January to February. BASILAN, Lanhil (Little Sibago) Island (at east entrance to Strait of Basilan), *Balhani 156* January to February. MINDANAO, Zamboanga Province, Pangapuyon (Pagapuan) Island, *Balhani 171,* January to February; northwest of Zamboanga, Baliwasan (Baliuasan), *Balhani 212,* January to February. BASILAN, 30 miles west-northwest of Isabela de Basilan, west of Basilan, Strait, Sangboy Islands, *Balhani 232,* January to February. MINDANAO, Zamboanga Province, Bilang-bilang near Moro community, *Balhani 307,* January to February; southeast of Zamboanga, Punta Mariki, *Balhani 366,* January to February; 15 miles northeast of Zamboanga, Manican (Manicahan), *Balhani 381,* January to February; northeast of Zamboanga, near Taluksangay, Babag, *Balhani 401,* January to February; 20 miles northwest of Zamboanga Labuan, *Balhani 422,* January to February; southeast of Zamboanga beyond Marike, Logoy near Moro cemetery, *Balhani 436,* January to February; northwest of Zamboanga beyond the Baliwasan River, Gavilan Point near Campo Islam, *Balhani 451,* January to February; Zamboanga Province, Pangapuyan Island, Bavaras, *Balhani 467,* January to February; 22 miles northeast of Zamboanga, Panubigan

(Panubijan) Island, *Balhani 491*, January to February. BASILAN, northeast coast of Basilan Island, near Lamitan, Sumut, *Balhani 517*, January to February; Toburan, *Balhani 541*, January to February; east point of Basilan Island, Punta Matangal, *Balhani 562*, January to February; east coast of Basilan Island, southwest of Punta Matangal, Sikeang, *Balhani 586*, January to February; west of Isabela de Basilan, Panigayan Islands, *Balhani 627*, January to February. MINDANAO, Zamboanga Province, Sibakel Island, *Balhani 648*, January to February. BASILAN, Tengolon (Teigolon) Island (west of Malusa Bay), *Balhani 679*, January to February; west of Basilan Island, east of Pilar Island, Baluk-baluk Island, *Balhani 733*, January to February; east point of Basilan Island, near Punta Matangal, Boboh, *Balhani 746*, January to February; east coast of Basilan Island, southwest of Matangal Point, Takut Tangug Bay, Lahilahi, *Balhani 791*, January to February; southwest of Matangal Point, Takut, Tangug Bay Bojelebung, *Balhani 802*, January to February; south coast of Basilan Island, Tanusa, *Balhani 861*, January to February. *Albatros Expedition 50*.

! CHAETOMORPHA GRACILIS Kützing.

C. gracilis KÜTZING (1845) 203.

LUZON, Manila and vicinity, *Merrill 7456a*, January to February. MINDORO, Lubang Island, *Villaflores 19*, September.

CHAETOMORPHA INFLATA Kützing.

C. inflata KÜTZING (1849) 378; MARTENS (1866).

This is one of the few reports of *C. inflata* as first described by Kützing from Java, since Martens' description was so brief and its occurrence appears to be so rare, it must be considered a doubtful record until verified.

*** CHAETOMORPHA KELLERSII Howe.**

C. kellersii HOWE (1932) 169, fig. 1; HOWE (1932).

Although this alga does not appear among the present collections, the writer has the opportunity to study the type material collected from the Philippines by H. C. Kellers. (*Philip. Bur. Sci. 19317.*)

! CHAETOMORPHA LINUM (Muller) Kützing.

C. linum (Muller; KÜTZING (1845) 204.

LUZON, Manila Bay, *Ramirez 7*, June; Manila Bay, *Ramirez 19*, July.

! CHAETOMORPHA TORTA (Farlow) McClatchie ex Yendo.

C. torta (Farlow) McCLATCHIE ex YENDO (1914) 264.

MINDANAO, Zamboanga, near Philippine Desiccated Coconut Factory, *Bartlett A–95*, January to February. BASILAN, Lanhil (Little Sibago) Island (at east entrance to Basilan Strait), *Balhani 155*, January to February.

The material coincides with the descriptions of the species, though it is slightly larger in diameter than those found in most places, as, for instance, the specimens from Hainan Island described by Tseng [(1936) 144].

DASYCLADALES

DASYCLADACEÆ

ACETABULARIA CALYCULUS Quoy & Gaimard.

A. *calyculus* QUOY & GAIMARD (1824) 621, Plate 90, figs. 6, 7; DICKIE (1877).

ACETABULARIA DENTATA Solms-Laubach.

A. *dentata* SOLMS–LAUBACH (1895) 23, Plate 1, fig. 11; GILBERT (1943).

ACETABULARIA MAJOR Martens.

A. *major* MARTENS (1866) 25, Plate 4, fig. 3; HOWE (1932); GILBERT (1943).

*** ACETABULARIA PHILIPPINENSIS Gilbert.**

A. philippinensis GILBERT (1943) 31, fig. 3; GILBERT (1943).

BORNETELLA SPHAERICA (Zanardini) Solms-Laubach.

B. oligospora SOLMS-LAUBACH (1893) 81, Plate 9, figs. 1–4, 5–7; WEBER-VAN BOSSE (1913); GILBERT (1943).

BORNETELLA NITIDA (Harvey) Munier-Chalmas.

B. nitida (Harvey) MUNIER-CHALMAS (1877) 816; GILBERT (1943).

BORNETELLA SPHAERICA (Zanardini) Solms-Laubach.

B. sphaerica (Zanardini) SOLMS-LAUBACH (1893) 92, Plate 9, fig. 8; WEBER-VAN BOSSE (1913); GILBERT (1943).

CYMPOLIA VAN-BOSSEÆ Solms-Laubach.

C. van-bosseæ SOLMS-LAUBACH (1893) 78, Plate 8b, figs. 9–10, 15–16; GILBERT (1943).

HALICORYNE WRIGHTII Harvey.

H. wrightii HARVEY (1859) 333.

NEOMERIS ANNULATA Dickie.

N. annulata DICKIE (1874) 198; GILBERT (1943).

NEOMERIS VAN-BOSSEÆ Howe.

N. van-bosseæ HOWE (1909) 80, Plate 1, figs. 4–7, Plate 5, figs. 17–19; GILBERT (1943).

POLYPHYSA SPICATA Dickie.

P. spicata DICKIE (1876); GILBERT (1943).

SIPHONALES

BRYOPSIDACEÆ

! BRYOPSIS INDICA A. & E. S. Gepp.

B. indica A. & E. S. GEPP (1908) 169, Plate 22, figs. 10, 11.

MACTAN, opposite Cebu, *Bartlett 16173*, September. MINDORO, near Puerto Galera, Hondura Bay, *Velasquez 807*, April.

! BRYOPSIS PENNATA var. SECUNDA (Harvey) Collins & Harvey.

B. pennata var. *secunda* (Harvey) Collins & Harvey (1917) 62.

BASILAN, Punta Mangal, *Ebalo A–31*, January.

Because of the characteristic distichous or secund arrangement of pinnules, the more or less flexuous axis, and the infrequent subdichotomous branching in the lower parts of the frond, the writer is in doubt about the similarity between specimens of this collection to *Bryopsis harveyana* J. Agardh, the name under which this variety of *B. pennata* is usually listed from the Pacific. The writer is inclined, however, to agree with Collins and Harvey [(1917) 61] that *B. harveyana* is not distinct from *B. pennata* Lamouroux, for many intermediate forms exist between the secund arrangement of pinnules in "*B. harveyana*" and the typical distichous arrangement of *B. pennata*.

The Philippine material does differ from the usual conception of *Bryopsis pennata*, however, in that some of the fronds are not linear-lanceolate and in that the wider part of the fronds may have pinnules which themselves bear a few secondary pinnules. It would seem that little significance can be attached to this, however, for specimens of both *B. pennata* and its var. *secunda* from Florida and Puerto Rico which the writer has studied, have pinnules that reach 5 mm in length and which, though rarely, bear secondary pinnules. These plants also showed in parts of their fronds the arrangement of pinnules in two series of two ranks on opposite sides of the axis, instead of a true distichous arrangement. This arrangement of pinnules was noted above for the Philippine material, and it does not seem to be at all unusual, for Setchell [(1926) 80, under *B. harveyana*] has previously called attention to it in Tahitian plants.

CAULERPACEÆ

! CAULERPA BRACHYPUS Harvey.

C. brachypus HARVEY (1859) 333.

BASILAN, north coast of Basilan Island, near Malamaui, Atong-atong, *Balhani 65*, January to February. MINDANAO, Zamboanga Province, Pangapuyon (Pagapuan) Island, *Balhani 180*, January to February; northwest of Zamboanga beyond the Baliwasan River, near Campo Islam, Gavilan Point, *Balhani 455*, January to February; opposite Zamboanga, Little Santa Cruz Island, *Bartlett A–200*, January to February.

The degree of variation in this species (as in many species of *Caulerpa*) is great, and the limits are not well defined. The Philippine plants (especially *Balhani 65, 180*) show considerable resemblance to *Caulerpa parvifolia Harvey*, almost occupying, it would seem, an intermediate position between the two species, but are here separated from *C. parvifolia* on the basis of a relatively robust stolon (about 1 to 1.5 mm broad) and fronds which, though subsessile or shortly stipitate, generally have obtuse bases. Not infrequently, however, on stolons with fronds having obtuse bases are found a few fronds with attenuated bases, a character of *C. parvifolia.*

When first described, *Caulerpa brachypus* was characterized by subsessile fronds, with obtuse apices and bases and later *C. parvifolia* [Harvey (1860) Plate 172] was described as distinct from *C. brachypus* by (in addition to a very delicate stolon) fronds which were regularly shortly stipitate and with attenuate bases, both species either with or without delicate dentations along the frond margins. It is now known that fronds of *C. brachypus* are occasionally shortly stipitate and may sometimes be attenuate at their bases, leaving what seems to be the only dependable character separating the two species that of the delicateness of the plant, especially of the stolon. Size variability within many species of *Caulerpa* is so great that one hesitates to let it bear much influence in the separation of species, but because the fronds in the specimens cited above are for the most part obtuse at their bases, and subsessile, and only occasionally attenuate and shortly stipitate, rather than regularly so, the writer is inclined to consider *Caulerpa brachypus* and *C. parvifolia* as distinct species, realizing that in time all intermediate forms between the two may be found, in which case it will necessitate the relegating of *C. parvifolia* to synonymy.

Quite in contrast to the delicateness of the Philippine specimens of *Caulerpa brachypus* are some of the plants listed previously by the writer [Gilbert (1942) 9] from Indonesia, the fronds of which are branching and sometimes much proliferating, reaching 9 cm in height and 8 mm in width, and which are borne on a stolon as broad as 3 mm. Forms as large as these bear little if any resemblance to *C. parvifolia.*

CAULERPA CRASSIFOLIA (C. Agardh) J. Agardh.

C. crassifolia (C. Agardh) J. AGARDH (1872) 13; WEBER-VAN BOSSE (1913); GILBERT (1942).

CAULERPA CUPRESSOIDES var. DISTICHA Weber-van Bosse.

C. cupressoides var. *disticha* WEBER-VAN BOSSE (1898) 338, Plate 27, fig. 14.

C. cupressoides var. *lycopodium* f. *amicorum* GILBERT (1942).

MINDORO, Puerto Galera, *Velasquez 880,* April. MINDANAO, opposite Zamboanga, Little Santa Cruz Island, *Bartlett A–021,* January to February. BASILAN, east point of Basilan Island, near Punta Matangal, Boboh, *Balhani 755,* January to February.

CAULERPA FASTIGIATA Montagne.

C. fastigiata MONTAGNE (1838) 19, Plate 2, fig. 3; GILBERT (1942).

MINDANAO, northeast of Zamboanga, Sakul Island, Landang, *Balhani 112,* January to February. BASILAN, 30 miles west-northwest of Isabela de Basilan, west of Basilan Strait, Sangbon Islands, *Balhani 237,* January to February; near Bagbagon, Luksapi, *Balhani 618,* January to February; off the west coast of Basilan Island, near Langas Island, Kilay (Langasmati) Island, *Balhani 702,* January to February; east coast of Basilan Island, southwest of Matangal Point, Takut Tangug Bay, Sangig, *Balhani 776,* January to February.

CAULERPA LENTILLIFERA J. Agardh.

C. lentillifera J. AGARDH (1837) 173; GILBERT (1942).

MINDORO, vicinity of Puerto Galera, Balatero Maliit, *Velasquez 766,* April. BASILAN, north coast of Basilan, near Malamaui, Atong-atong, *Balhani 62,* January to February. MINDANAO, northeast of Zamboanga, Sakul Island, Landang, *Balhani 115,* January to February; northwest of Zamboanga, near Caldera Bay, at kilometer 13 on shore road, Sinunug, *Balhani 354,* January to February; 15 miles northeast of Zamboanga, Manicaan, *Balhani 389,* January to February; northeast of Zamboanga, near Taluk-sangay, Babag, *Balhani 410,* January to February; 20 miles northwest of Zamboanga, Labuan, *Balhani 428,* January to February, northwest of Zamboanga beyond the Baliwasan River, Gavilan Point, near Campo Islam, *Balhani 457,* January to February. BASILAN, near Bagbagon, Luksapi, *Balhani 616,* January to February; east point of Basilan Island, near Punta Matangal, Boboh, *Balhani 754,* January to February; east coast of Basilan Island, southwest of Matangal Point, Takut Tangug Bay, Sangig, *Balhani 770.*

CAULERPA PARVIFOLIA Harvey.

C. parvifolia HARVEY, Phyc. Austr. (1860) Plate 172; GILBERT (1942).

! CAULERPA RACEMOSA var. CHEMNITZIA (Esper) Weber-van Bosse.

C. racemosa var. *chemnitzia* (Esper) WEBER-VAN BOSSE (1898) 370, plate 31, figs. 5–8.

BASILAN, north coast of Basilan Island, near Malamaui, Atong-atong, *Balhani 61,* January to February, 30 miles west-northwest of Isabela de Basilan, west of Basilan Strait, Sangboy Islands, *Balhani 236,* January to February.

CAULERPA RACEMOSA var. CLAVIFERA (Turner) Weber-van Bosse.

C. racemosa var. *clavifera* (Turner) WEBER-VAN BOSSE (1898) 361, Plate 33, figs. 1–5.
Chauvinia clavifera MARTENS (1866).
Caulerpa clavifera DICKIE (1876); HOWE (1932); GILBERT (1942).

MINDORO, vicinity of Puerto Galera, west shore of Muelle, *Velasquez 748,* April; near Puerto Galera, Balatero Malaki, *Velasquez 875,* April; near Puerto Galera, Medio Island, *Velasquez 905,* April. MINDANAO, northeast of Zamboanga, Sakul Island, Landang, *Balhani 114,* January to February. BASILAN, Sibago Island (at east entrance to Strait of Basilan), *Balhani 125,* January to February. MINDANAO, Zamboanga, near Army Post, Calarian (Kaladian), *Balhani 259* January to February; Zamboanga Province, Bilang-bilang near Moro Community, *Balhani 311,* January to February. BASILAN, northeast coast of Basilan Island, near Lamitan, Balas (Nipa Balas), *Balhani 326,* January to February; Isabela Channel, Tundun Pasil near the lighthouse, *Balhani 339,* January to February. MINDANAO, northwest of Zamboanga near Caldera Bay, at Kilometer 13 on shore road, Sinunug, *Balhani 365,* January to February; 15 miles northeast of Zamboanga, Manicaan (Manicahan), *Balhani 388,* January to February; southeast of Zamboanga beyond Marike, Logoy near Moro cemetery, *Balhani 441,* January to February; northwest of Zamboanga beyond the Baliwasan River, near Campo Islam, Gavilan Point, *Balhani 456,* January to February. BASILAN, northeast coast of Basilan Island, near Lamitan, Sumut), *Balhani 528,* January to February; east coast of Basilan Island, southwest of Punta Matangal, Sikeang, *Balhani 588,* January to February.

CAULERPA RACEMOSA var. CORYNEPHORA (Montagne) Weber-van Bosse.

C. racemosa var. *corynephora* (Montagne) WEBER-VAN BOSSE (1898) 364, Plate 33, figs. 10–14; GILBERT (1942).

CAULERPA RACEMOSA var. GRACILIS (Zanardini) Weber-van Bosse.

C. racemosa var. *gracilis* (Zanardini) WEBER-VAN BOSSE (1898) 370; GILBERT (1942).

CAULERPA RACEMOSA var. LAMOUROUXII (Turner) Weber-van Bosse.

C. racemosa var. *lamourouxii* (Turner) WEBER-VAN BOSSE (1898) 368, Plate 34, figs. 1–7; Plate 38, fig. 15.

MINDANAO, opposite Zamboanga, Little Santa Cruz Island, *Bartlett A–202,* January to February.

CAULERPA RACEMOSA var. LAETEVIRENS (Montagne) Weber-van Bosse.

C. racemosa var. *laetevirens* (Montagne) WEBER-VAN BOSSE (1898) 366, Plate 33, figs. 16–22.
C. laetevirens PICCONE (1886); GILBERT (1942).

MINDANAO, Zamboanga Province, Pangapuyon (Pagapuan) Island, *Balhani 179,* January to February; northwest of Zamboanga, near Caldera Bay, at Kilometer 13 on shore road, Sinunug, *Balhani 355,* January to February; southeast of Zamboanga, Punta Mariki, *Balhani 372,* January to February; 15 miles northeast of Zamboanga, Manicaan (Manicahan), *Balhani 400,* January to February; northeast of Zamboanga, near Taluk-sangay, Babog, *Balhani 409,* January to February; southeast of Zamboanga beyond Mariki, near Moro cemetery, Logoy, *Balhani 448,* January to February. BASILAN, east coast of Basilan Island, southwest of Punta Matangal, beyond Sikeang, Kapago, *Balhani 606*, January to February; near Bagbayon, Luksapi, *Balhani 615*, January to February; near Basilan Point, Bagbagon, *Balhani 716*, January to February; west of Basilan Island, east of Pilas Island, Baluk-baluk Island, *Balhani 735*, January to February; near Punta Matangal (east Point of Basilan Island), Boboh, *Balhani 753*, January to February. BASILAN, east coast of Basilan Island, southwest of Matangal Point, Takut Tangug Bay, Sangig, *Balhani 777*, January to February; off southeast coast of Basilan Island, Kauluan (Kaulungan) Island, *Balhani 816*, January to February; south coast of Basilan Island, Sittio Pohu, *Balhani 830*, January to February; south coast of Basilan Island, Amoyloi (Amelui-boje-boje), *Balhani 842*, January to February.

CAULERPA RACEMOSA var. MACRA Weber-van Bosse.

C. racemosa var. *macra* WEBER-VAN BOSSE (1913) 106, fig. 26; GILBERT (1942).

CAULERPA RACEMOSA var. MACROPHYSA (Kützing) Taylor.

C. racemosa var. *macrophysa* (Kützing) TAYLOR (1928) 101, Plate 12, fig. 3; Plate 13, fig. 9; GILBERT (1942).

MINDORO, near Puerto Galera, Varadero Bay, Balete, *Velasquez 828*, April. MINDANAO, Zamboanga Province, near Philippine Desiccated Coconut Factory, *Bartlett A–87*, January to February. BASILAN, Lanhil (Little Sibago) Island (at east entrance to Strait of Basilan), *Balhani 161*, January to February. MINDANAO, northwest of Zamboanga, Baliwasan (Baliuasan), *Balhani 215*, January to February.

CAULERPA RACEMOSA var. PELTATA (Lamouroux) Eubank.

C. racemosa var. *peltata* (Lamouroux) EUBANK (1946) 421.
C. peltata DICKIE (1876).
C. peltata GILBERT (1942).

MINDORO, near Puerto Galera, Balatero Malaki, *Velasquez 771, 872*, April. BASILAN, Punta Mangal, *Ebalo A–29*, January. MINDANAO, Zamboanga Province, Calarian (Kaladian) near Army Post, *Balhani 260*, January to February; Zamboanga Province, Sibakel Island, *Balhani 656*, January to February. BASILAN, southwest of Matangal Point, Takut Tangug Bay, Bojelebung, *Balhani 806*, January to February.

CAULERPA RACEMOSA var. UVIFERA (Turner) Weber-van Bosse.

C. racemosa var. *uvifera* (Turner) WEBER-VAN BOSSE (1898) 362, Plate 33, figs. 6, 7; GILBERT, 1942.

MINDANAO, 20 miles northwest of Zamboanga, Labuan, *Balhani 429*, January to February; Zamboanga Province, Pangapuyan (Pagapuan) Island, Bavara, *Balhani 471*, January to February.

CAULERPA SELAGO (Turner) C. Agardh.

C. selago (Turner) C. AGARDH (1822) 442; WEBER-VAN BOSSE (1913).

CAULERPA SERRULATA (Fosskål) J. Agardh emend. Börgesen.

C. serrulata (Forsskål) J. AGARDH emend. BÖRGESSEN (1932) 5.
C. Freycinettii WEBER-VAN BOSSE (1913).
C. serrulata var. *typica* f. *serrulata* (Forsskål) GILBERT (1942).

BASILAN, north coast of Basilan Island, near Malamaui, Atong-atong, *Balhani 63*, January to February. MINDANAO, northeast of Zamboanga, Sakul Island, Landang, *Balhani 113*, January to February.

CAULERPA SERRULATA var. TYPICA f. LATA (Weber-van Bosse) Tseng.

C. serrulata var. *typica* f. *lata* (Weber-van Bosse) TSENG (1936) 178; GILBERT (1942).

MINDORO, near Puerto Galera, Paniquian Island, *Velasquez 776, 840, 911, 996*, April. MINDORO, near Puerto Galera, Baradero Bay, Balete, *Velasquez 806*, April; near Puerto Galera, Medio Island, *Velasquez 849*, April; vicinity of Puerto Galera, Balatero Malaki, *Velasquez 881*, April; near Puerto Galera, east side of Muelle, Farola, *Velasquez 907*, April; vicinity of Puerto Galera, San Teodoro Municipality, *Velasquez 1025*, April. PALAWAN, Puerto Princesa, Buenavista, *Santos 657*, April. BASILAN, Tumakid, *Ebalo A–19*, January; Punta Mangal, *Ebalo A–28*, January; Lanhil (Little Sibago) Island (at east entrance to Strait of Basilan), *Balhani 160*, January to February; Isabela Channel, Tundun Pasil near the lighthouse, *Balhani 340*, January to February. MINDANAO, northwest of Zamboanga, near Caldera Bay, at Kilometer 13 on shore road, Sinunug, *Balhani 353*, January to February; northwest of Zamboanga beyond the Baliwasan River, Gavilan Point near Campo Islam, *Balhani 458*, January to February. BASILAN, east point of Basilan Island, Punta Matangal, *Balhani 567*, January to February; east coast of Basilan, southeast of Punta Matangal beyond Sikeang, Kapago, *Balhani 605*, January to February; south coast of Basilan Island, Amoyloi (Amelui-boje-boje) *Balhani 841*, January to February.

CAULERPA SERRULATA var. BORYANA f. OCCIDENTALIS (Weber-van Bosse) Gilbert.

C. serrulata var. *boryana* f. *occidentalis* (Weber-van Bosse) GILBERT (1942) 15.

* **CAULERPA SERRULATA var. BORYANA f. LONGIFOLIA Gilbert.**

C. serrulata var. *boryana* f. *longifolia* GILBERT (1942) 16, figs. 4, 5.

CAULERPA SERTULARIOIDES (Gmelin) Howe.

C. sertularioides (Gmelin) HOWE (1905) 576.
C. plumaris MONTAGNE (1842); DICKIE (1876); WEBER-VAN BOSSE (1913).

CAULERPA SERTULARIOIDES f. BREVIPES (J. Agardh) Svedelius.

C. sertularioides f. *brevipes* (J. Agardh) SVEDELIUS (1906) 114; GILBERT (1942).

MINDORO, vicinity of Puerto Galera, Ensanada, *Velasquez 811*, April.

CAULERPA SERTULARIOIDES f. LONGISETA (Bory) Svedelius.

C. sertularioides f. *longiseta* (Bory) SVEDELIUS (1906) 114; GILBERT (1942).

MINDORO, vicinity of Puerto Galera, Muelle, *Velasquez 747*, March; near Puerto Galera, Balatero Malaki, *Velasquez 768*, April; vicinity of Puerto Galera, east side of Muelle, Farola, *Velasquez 908*, April; vicinity of Puerto Galera, Hondura Bay, *Velasquez 920*, April. PALAWAN, Puerto Princesa, Buenavista, *Santos 646*, April. BASILAN, north coast of Basilan Island, near Malamaui, Atong-atong, *Balhani 64*, January to February: Lanhil (Little Sibago) Island (at east entrance to Strait of Basilan), *Balhani 162*, January to February; northeast coast of Basilan Island, near Lamitan, Sumut (Summot), *Balhani 527*, January to February; Tengolan (Teingolan) Island (west of Malusa Bay, Basilan Island), *Balhani 683*, January to February. MINDANAO, Zamboanga, near Philippine Dessicated coconut Factory, *Bartlett A–86*, January to February; opposite Zamboanga, Little Santa Cruz Island, *Bartlett A–203*, January to February.

CAULERPA TAXIFOLIA (Vahl) C. Agardh.

C. taxifolia (Vahl) C. AGARDH (1822) 435; MONTAGUE (1844); GILBERT (1942).

BASILAN, southwest of Matangal Point, Takut Tangug Bay, *Balhani 805*, January to February.

! CAULERPA VERTICILLATA J. Agardh.

C. verticillata J. AGARDH (1847) 6.

PALAWAN, Puerto Princesa, Buenavista, Wugan Bay, Santos *659*, April, Puerto Princesa, Sabang, St. Paul's Bay, *Santos 679*, April. BASILAN, near Bagbagon, Liksapi, *Balhani 617*, January to February; off the west coast of Basilan Island, near Langas Island, Kilay (Langasmati) Island, *Balhani 700*, January to February; east coast of Basilan Island, southwest of Matangal Point, Takut Tangug Bay, Sangig, *Balhani 778*, January to February.

CODIACEÆ

***AVRAINVILLEA ERECTA (Berkeley) A. & E. S. Gepp.**

A. erecta (Berkeley) A. & E. S. GEPP (1911) 29, Plate 9, figs. 84, 85; Plate 1, figs. 86–89.
Dichonema erectum BERKELEY (1842).
Udotea sordida MONTAGNE (1844); A. & E. S. GEPP (1911); GILBERT (1947).

CHLORODESMIS COMOSA Bailey & Harvey.

C. comosa BAILEY & HARVEY (1851) 373; GILBERT (1947).

CHLORODESMIS FORMOSANA Yamada.

C. formosana YAMADA (1925) 92, fig. 5; GILBERT (1947).

CHLORODESMIS HILDEBRANDTII A. & E. S. Gepp.

C. hildebrandtii A. & E. S. GEPP (1911) 16, 137, Plate 8, figs. 74, 75a; Plate 9, fig. 75b; GILBERT (1947).

CODIUM ADHAERENS (Cabrera) C. Agardh.

C. adhaerens (Cabrera) C. AGARDH (1822) 457; DICKIE (1876); GILBERT (1947).

***CODIUM BARTLETTII Tseng & Gilbert.**

C. bartlettii TSENG & GILBERT (1942) 291, figs. 1, 2a; TSENG & GILBERT (1942); GILBERT (1947).

CODIUM CONTRACTUM Kjellman.

C. contractum KJELLMAN (1897) 35, Plate 2, fig. 12; Plate 7, figs. 1–3; GILBERT (1947).

CODIUM CORONATUM Setchell.

C. coronatum SETCHELL (1926) 82, Plate 10, figs. 2–5; Plate 11, figs. 2, 3; Plate 12, figs. 1, 5; GILBERT (1947).

CODIUM DICHOTOMUM (Hudson) S. F. Gray.

C. dichotomum (Hudson) S. F. GRAY (1821) 293.
C. tomentosum MONTAGNE (1844).
C. tomentosum DICKIE (1876).
C. tomentosum PICCONE (1886).

CODIUM DIFFORME Kützing.

C. difforme KÜTZING (1843) 300; A. & E. S. GEPP (1911); WEBER-VAN BOSSE (1913).

CODIUM ELONGATUM C. Agardh.

C. elongatum C. AGARDH (1822) 454; A. & E. S. GEPP (1911); WEBER-VAN BOSSE (1913).

CODIUM GEPPII Schmidt.

C. geppii SCHMIDT (1923) 50, fig. 33; GILBERT (1947).

CODIUM INTRICATUM Okamura.

C. intricatum OKAMURA, Icon. (3) 3 (1913) 74, Plate 120, figs. 9–13; GILBERT (1947).

CODIUM OVALE Zanardini.

C. ovale ZANARDINI (1878) 37; A. & E. S. GEPP (1911); WEBER-VAN BOSSE (1913).

***CODIUM PAPILLATUM Tseng & Gilbert.**

C. papillatum TSENG & GILBERT (1942) 203, figs. 2b–d, 3; TSENG & GILBERT (1942); GILBERT (1947).

CODIUM TENUE Kützing.

C. tenue KÜTZING, Tab. Phyc. 6 (1856) Plate 95; A. & E. S. GEPP (1911); WEBER-VAN BOSSE (1913).

HALIMEDA DISCOIDEA Decaisne.

H. discoidea DECAISNE (1842) 91; MONTAGNE (1844); MARTENS (1866).

HALIMEDA DISCOIDEA f. DISCOIDEA Decaisne.

H. discoidea f. *discoidea* [= *H. discoidea* f. *typica* Howe ex Börgesen (1911) 134]; GILBERT (1947).

***HALIMEDA DISCOIDEA f. INTERMEDIA Gilbert.**

H. discoidea f. *intermedia* GILBERT (1947) 126; GILBERT (1947).

***HALIMEDA DISCOIDEA f. SUBDIGITATA Gilbert.**

H. discoidea f. *subdigitata* GILBERT (1947) 125; GILBERT (1947).

HALIMEDA GRACILIS Harvey ex. J. Agardh.

H. gracilis HARVEY ex J. AGARDH (1887) 82.
H. cuneata KÜTZING; MARTENS (1866).

HALIMEDA MACROLOBA Decaisne.

H. macroloba DECAISNE (1842) 118; DICKIE (1876); BARTON (1901); WEBER-VAN BOSSE (1913).

HALIMEDA MONILE (Ellis & Solander) Lamouroux.

H. monile (Ellis & Solander) LAMOUROUX (1812) 186; GILBERT (1947).

HALIMEDA OPUNTIA Linnaeus.

H. opuntia LINNÆUS (1758) 805; MARTENS (1866); DICKIE (1876); BARTON (1901); WEBER-VAN BOSSE (1913).

HALIMEDA OPUNTIA f. CORDATA (J. Agardh) Barton.

H. opuntia f. *cordata* (J. Agardh) BARTON (1901) 20, Plate 2, fig. 21; GILBERT (1947).

HALIMEDA OPUNTIA f. HEDERACEA Barton.

H. opuntia f. *hederacea* BARTON (1901) 21, Plate 3, fig. 23; GILBERT (1947).

HALIMEDA OPUNTIA f. INTERMEDIA Yamada.

H. opuntia f. *intermedia* YAMADA (1934) 81, figs. 50, 51; GILBERT (1947).

HALIMEDA OPUNTIA f. OPUNTIA Linnæus.

H. opuntia f. *opuntia* [= *H. opuntia* f. *typica* Barton (1901) 20, Plate 2, fig. 19]; GILBERT (1947).

HALIMEDA OPUNTIA f. RENCHII (Hauck) Barton.

H. opuntia f. *renchii* (Hauck) BARTON (1901) 21, Plate 2, figs. 22, 22a; GILBERT (1947).

HALIMEDA MICRONESICA Yamada.

H. micronesica YAMADA (1941) 121, fig. 15.
H. orientalis GILBERT (1947).

HALIMEDA INCRASSATA (Ellis) Lamouroux.

H. incrassata (Ellis) LAMOUROUX (1812) 186; [= *H. tridens* f. *typica* (Barton) COLLINS (1909) 318]; GILBERT (1947).
H. tridens f. *typica* (Barton) COLLINS; GILBERT (1947).

Ellis contends that *Halimeda incrassata* (Ellis) Lamouroux has precedence over *H. tridens* (Ellis & Solander) Lamouroux and offers good evidence in her unpublished dissertation.

HALIMEDA INCRASSATA f. LAMOUROUXII J. Agardh.

H. incrassata f. *lamourouxii* J. AGARDH (1886) 86.
H. tridens f. *lamourouxii* (J. Agardh) GILBERT (1947).

HALIMEDA TUNA (Ellis & Solander) Lamouroux.

H. tuna (Ellis & Solander) LAMOUROUX (1812) 186; DICKIE (1876).

HALIMEDA TUNA f. PLATYDISCA (Decaisne) Barton.

H. tuna f. *platydisca* (Decaisne) BARTON (1901) 14, Plate 1, fig. 2; GILBERT (1947).

TYDEMANIA EXPEDITIONIS Weber-van Bosse.

T. expeditionis WEBER-VAN BOSSE (1901) 139; GILBERT (1947).

UDOTEA ARGENTEA var. SPUMOSA A. & E. S. Gepp.

U. argentea var. *spumosa* A. & E. S. GEPP (1911) 126, Plate 2, fig. 15; Plate 3, fig. 25a; Plate 7, figs. 61–62; A. & E. S. Gepp (1911); WEBER-VAN BOSSE (1913); GILBERT (1947).

UDOTEA FLABELLUM (Ellis & Solander) Lamouroux.

U. flabellum (Ellis & Solander) LAMOUROUX (1812) 186; A. & E. S. GEPP (1911); WEBER-VAN BOSSE (1913); GILBERT (1947).

UDOTEA JAVENSIS (Montagne) A. & E. S. Gepp.

U. javensis (Montagne) A. & E. S. GEPP (1904) 368, Plate 467, figs. 1–4; GILBERT (1947).

UDOTEA ORIENTALIS A. & E. S. Gepp.

U. orientalis A. & E. S. GEPP (1911) 119, figs. 1, 4, 47, 48; WEBER-VAN BOSSE (1913); GILBERT (1947).

BIBLIOGRAPHY

1. AGARDH, C. A. Species Algarum rite cognitae cum synonymis, differentiis specificis et descriptionibus succinctis 1 (1822) 169–531.
2. AGARDH, J. G., Novae Species Algarum, quas in itinere ad oras maris rubri collegit Eduardus Ruppell. Mus. Senckenb., Abhandl. aus dem Gebiete der beschreib. Naturgesh. 2 (1837) 171–174.
3. AGARDH, J. G. Nya Alger fran Mexico. Oefvers af Kongl. Vet.-Akad., Forhandl. (1) 4 (1847) 5–17.
4. AGARDH, J. G. Till Algernes Systematik, I. Caulerpa., II. Zonaria., III. Sargassum. Lunds Univ. Arsskr. (3) 9 (1872) 1–71.
5. AGARDH, J. G. Till Algernes Systematik, VI. Ulvaceæ. Lunds Univ. Arsskr. (2) 19 (1883) 1–177, Plates 1–4.
6. AGARDH, J. G. Till Algernes Systematik, VIII. Siphoneæ. Lunds Univ. Arsskr. (2) 23 (1886) 1–174, Plates 1–5.
7. ARESCHOUG, J. E. Spongocladia, ett nytt algslagte. Ofversigt af Kongl. Vetensk. Akad, Forhandl. 10 (1853) 201–209.
8. BAILEY, J. W., and W. H. HARVEY. Descriptions of algæ from the Wilkes United States exploring expedition in proceedings of the meeting for December 4, 1850. Proc. Boston Soc. Nat. Hist. 3 (1851) 369–378.
9. BARTON, E. S. The genus Halimeda. Siboga Exped. Monogr. 60 (1901) 32 pp., 4 pls.
10. BERKELEY, M. J. Enumeration of fungi collected by H. Cuming in the Philippine Islands. Hooker, Lond. Jour. Bot. 1 (1842) 142–157.
11. BÖRGESEN, F. Some Chlorophyceæ from the Danish West Indies. Bot. Tidsskr. 31 (1911) 121–152.
12. BÖRGESEN, F. A revision of Forsskål's algæ mentioned in flora Aegyptiaco-arabica and found in his herbarium in the Botanical Museum of the University of Copenhagen. Dansk. Botanisk. Arkiv (2) 8 (1932) 1–14, Plate 1.
13. BÖRGESEN, F. Some marine algæ from the northern part of the Arabian Sea with remarks on their geographical distribution. Kgl. Danske Vidensk. Selskab. Biol. Med. (6) 11 (1934) 1–72.
14. BÖRGESEN, F. A list of marine algæ from Bombay. Kgl. Danske Vidensk. Selsekab. Biol. Med. (2) 12 (1935) 1–64.
15. BÖRGESEN, F. Some marine algæ from Mauritius, I. Chlorophyceæ. Kgl. Danske Vidensk. Selsk. Biol. Med. (4) 15 (1940) 1–81, Plates 1–3.
16. BRAND, F. Uber die Anheftung der Cladophoraceen und uber verschiedene polynesische Formen dieser Familie. Beihefte Bot. Centralb. 18 (1905) 165–193, Plates 5, 6.

17. COLLINS, F. S. The green algæ of North America. Tufts College Studies (3) 2 (1909) 79–480.
18. COLLINS, F. S., and A. B. HARVEY. The algæ of Bermuda. Proc. Amer. Acad. Arts. Sci. (1) 53 (1917) 3–195, Plates 1–6.
19. DECAISNE, M. J. Memoire sur les Corallines ou Polypiers calciferes. Ann. Sci. Nat., 2nd ed. ser. 18 (1842) 96–128.
20. DECAISNE, M. J. Note sur quelques Algues a frondes réticulés. Ann. Sci. Nat. Bot. 3rd ed. ser. 2 (1844) 233–236.
21. DELILE, A. R. Flora d'Egypte. Explication des planches, par M. Delile. In France. Commission d'Egypte ou recueil des observations et des recherches. . . . Hist. Nat. 2 (1813) 752 pp.
22. DICKIE, G. On the algæ of Mauritius. Journ. Linn. Soc. Bot. 14 (1874) 190–202.
23. DICKIE, G. Contributions to the botany of the expedition of H.M.S. 'Challenger'. Algæ, chiefly Plynesian. Journ. Linn. Soc. Bot. 15 (1876) 235–246.
24. DICKIE, G. Supplementary notes on algæ collected by H. N. Moseley, M.A., of H.M.S. 'Chellenger' from various localities. Journ. Linn. Soc. Bot. 15 (1877) 486–489.
25. EGEROD, LOIS E. An analysis of the Siphonous chlorophycophyta with special reference to the Siphonocladales, Siphonales, and Dasycladales of Hawaii. Univ. Cal. Publ. Bot. (5) 25 (1952) 325–454, Plates 29–42.
26. EUBANK, LOIS L. Hawaiian representatives of the genus Caulerpa. Univ. Cal. Publ. Bot. (18) 18 (1946) 409–432.
27. FELDMAN, J. Sur un nouveau genre de Siphonocladacees. Comptes rendus des seances de l'Academie des Sciences 206 (1938) 1503–1504.
28. FORSSKÂL, P. Flora Aegyptiaco-arabica (1775) 220 pp., 1 map. Hauniae.
29. GEPP, A., and E. S. Rhipidosiphon and Callipsygma. Journ. Bot. 42 (1904) 363–366, Plate 467.
30. GEPP, A., and E. S. Marine algæ (Chlorophyceæ and Phaeophyceæ) and marine phanerogams of the 'Sealark' Expedition, collected by J. Stanley Gardiner. . . . Trans. Linn. Soc. London, Botany, 2nd ser. (10) 7 (1908) 163–188.
31. GEPP, A., and E. S. The Codiaceæ of the Siboga expedition. Siboga Exped. Monogr. 62 (1911) 150 pp., 22 pls.
32. GILBERT, W. J. Notes on Caulerpa from Java and the Philippines. Pap. Mich. Acad. Sci. Arts and Letters 27 (1941) 7–26.
33. GILBERT, W. J. Studies on Philippine Chlorophyceæ, I. The Dasy, cladaceæ. Pap. Mich. Acad. Sci. Arts and Letters 28 (1942) 15–35. 15–35.
34. GILBERT, W. J. Studies on Philippine Chlorophyceæ, II. Survey of literature and list of recorded species prior to 1940. Bull. Torr. Bot. Club 73 (1946) 73–79.
35. GILBERT, W. J. Studies on Philippine Chlorophyceæ, III. The Codiaceæ. Bull. Torr. Bot. Club 74 (1947) 121–132.
36. GRAY, J. E. On Anadyomene and Microdictyon, with the description of three new allied genera, discovered by Menzies in the Gulf of Mexico. Journ. Bot. 4 (1866) 41–51, 65–72.

37. HARVEY, W. H. Nereis Boreali-Americana. Melanospermae, Part 1 (1852) 150 pp.; Rhodospermæ, Part 2 (1853) 258 pp.; Chlorospermæ and Suppl., Part 3 (1958) 140 pp.

38. HARVEY, W. H. Phycologia Australica **3** (1860) Plates 121–180; **5** (1863) Plates 241–300. London.

39. HARVEY, W. H. Characters of new algæ, chiefly from Japan and adjacent regions, collected by C. Wright in the North Pacific Exploring Expedition. Proc. Amer. Acad. Arts and Sci. **4** (1859) 327–335.

40. HOWE, M. A. Phycological studies, II. New Chlorophyceæ, New Rhodophyceæ and miscellaneous notes. Bull. Torr. Bot. Club **32** (1905) 563–586, Plates 23–29.

41. HOWE, M. A. Phycological studies, IV. The genus Neomeris and notes on other Siphonales. Bull. Torr. Bot. Club **36** (1909) 75–104, Plates 1–8.

42. HOWE, M. A. Marine algæ from the islands of Panay and Negros (Philippines) and Niuafoou (between Samoa and Fiji). Journ. Wash. Acad. Sci. (7) **22** (1932) 167–170.

43. KJELLMAN, F. R. Marina Chlorophyceer fran Japan. Bih. Till K. Svensk. Vet Akad. Handl. (11) **23** (1897) 1–44, Plates 1–7.

44. KUCKUCK, P. Uber den Bau und die Fortpflanzung von Halicystis Areschoug und Valonia Ginnani. Bot. Zeit. **65** (1907) 139–185, Plates 3, 4.

45. KÜTZING, F. T. Phycologia generalis; oder Anatomie, Physiologie und Systemkunde der Tange (1843) xxxii + 458 pp., 80 pls.

46. KÜTZING, F. T. Phycologia germanica, d. i. Deutschlands algen in bundigen beschreibungen (1845) x + 340 pp.

47. KÜTZING, F. T. Diagnosen und Bemerkungen zu neuen oder kritischen Algen. Bot. Zeit. **5** (1847) 1–5, 22–25, 33–38, 52–55, 164–167, 177–180, 193–198, 219–223.

48. KÜTZING, F. T. Species Algarum (1849) 922 pp.

49. KÜTZING, F. T. Tabulae Phycologicae . . . **3** (1853) 28 pp., 100 pls.; **6** (1856) 35 pp., 100 pls.; **16** (1866) 35 pp., 100 pls.

50. LAMOUROUX, J. V. Sur la classification des Polypiers coralligenes non entierement pierreux. Soc. Philom. N. Bull. **3** (1812) 181–183.

51. LINK, H. F. Epistola . . . de Algis aquaticis in genera disponendis: No. 1, in C. G. D. Nees von Esenbeck, Horae physicae Berolinensis collectae ex symbolis virorum doctorum . . . edi curavit . . . C. G. Nees ab Esenbeck (1820) xii + 123 pp., 27 pls.

52. LINNÆUS, C. Species plantarum, exhibentes plantas rite cognitas, ad genera relatas . . . secundum systema sexuale digestas **2** (1753) 561–1200.

53. LINNÆUS, C. Flora svecica, exhibens Plantas per regnum Sveciae crescentes, etc. Editio secunda (1755) ii + xxxii + 464 + 30 pp., 1 pl.

54. LINNÆUS, C. Systema Naturae, per regna trianaturae secundum classes, ordines, genera, species cum characteribus, differentiis, synonymis, locis, 10th ed. **1** (1758) 828 + iii pp.

55. MARTENS, G. VON. Die Preussische Expedition nach Ost-Asien. Tange. Bot. Theil. (1866) 4–152, Plate 1–5.

56. Merrill, E. D. Species Blancoanæ, a critical revision of the Philippine species of Plants described by Blanco and by Llanos. Dept. Agr. Nat. Res., Manila, Publ. No. 12 (1918) 423 pp., 1 map.

57. Montagne, J .F. C. Botanique–Plantes cellulaires (1838) x + 549 pp., 20 pls. In R. de la Sagra, Histoire, physique, politique et naturelle de l'ile de Cuba. Pt. II. Vol. 8, Atlas, II (Cryptogamie).

58. Montagne, J. F. C. Prodromus generum specierumque phycearum novarum, in itinere ad polum antarcticum regis Ludovici Philippi Jussu ab illustri Dumont D'Urville peracto collectarum (1842) 16 pp.

59. Montagne, J. F. C. Plantae Cellulares in Insulis Philippinensibus a cl. Cuming collectae. Hooker, Lond. Journ. Bot. 3 (1844) 632–634.

60. Munier-Chalmas. Observations sur les Algues calcaires appartenent au groupe des Siphonces verticillees (Dasycladées Harv.) et confonducs avec less Foraminiferes. Comp. Rendus Hebd. des Séances de l'Acad. Sci. 85 (1877) 814–817.

61. Okamura, K. Incomes of Japanese Algæ (8, 9) 1 (1908); (10) 2 (1912); (1, 2, 4) 3 (1913); (7, 10) 3 (1915); (1) 4 (1916); (2) 6 (1929); (6) 6 (1931); (7) 6 (1932) Tokyo.

62. Okamura, K. Manual of Japanese Seaweeds (1936) 9 + 6 + 964 + 11 pp.

63. Piccone, A. Alghe del viaggio di circumnavigazione della Vettor Pisani (1886) 97 pp., 2 pls.

64. Quoy et Gaimard. In Freycinet, Voyage autour du monde, . . .exécuté sur les corvettes de L. M. l'Uranie et al Physicienne 3 (1824) Zoologie.

65. Reinbold, T. Einege neue Chlorophyceen aus dem Ind. Ocean. Nuova Not. Ser. 16 (1905) 145–149.

66. Roth, A. W. Catalecta Botanica quibus Plantae novae et minus cognitae describuntur atque illustrantur (1797–1806) 3 Fasc. (In 2 vols.)

67. Schmidt, O. C. Beitrage zur Kenntnis der Gattung Codium Stackhouse. Bibl. Bot. (19) 23 (1923) 1–65.

68. Setchell, W. A. Tahitian algæ. Univ. Cal. Publ. (5) 12 (1926) 61–142, Plates 7–22.

69. Setchell, W. A. The genus Microdictyon. Univ. Calif. Publ. Bot. (20) 14 (1929) 453–588.

70. Setchell, W. A. The Templeton Croker Expedition of the California Academy of Sciences No. 31 (1932). A preliminary report on the algæ. Proc. Cal. Acad. Sci., 4th ser. (2) 22 (1937) 65–98, Plates 3–25.

71. Solms-Laubach, H. Grafen zu. Uber die Algengenera Cymopolia, Neomeris, und Bornetella. Ann. Jard. Bot. Buit. 11 (1893) 61–97, Plates 8a, 8b, 9.

72. Solms-Laubach, H. Grafen zu. Monograph of the Acetabularieæ. Trans. Linn. Soc., 2nd ser. 5 (1895) 1–39, Plates 1–4.

73. Stockmayer, S. Ueber die Algengattung Rhizoclonium. Verh. Zool.-Bot. Ver. Wien 40 (1890) 571–586.

74. Svedelius, N. Ecological and systematic studies of the Ceylon species of Caulerpa. Ceyl. Mar. Biol. Rep. 4 (1906) 81–144.

75. Taylor, W. R. The marine algæ of Florida, with special reference to the Dry Tortugas. Pap. Tortugas Lab., Carnegie Inst. Wash. 25 (1928) 1–219, Plates 1–37.

76. Tseng, C. K. Studies on the marine Chlorophyceæ from Hainan. Amoy Mar. Biol. Bull. 1 (1936) 129–200, Plate 1.

77. Tseng, C. K., and W. J. Gilbert. On new algæ of the genus Codium from the South China Sea. Journ. Wash. Acad. Sci. (10) 32 (1942) 291–296.

78. Weber-van Bosse, A. Monographie des Caulerpes. Ann. Jard. Bot. Buit. (2) 15 (1898) 243–401, Plates 20–34.

79. Weber-van Bosse, A. Tydemania expeditionis. Ann. Jard. Bot. Buit. 17 (1901) 126–141, Plates 17–19.

80. Weber-van Bosse, A. Liste des algues du Siboga, I (Myxophyceæ, Chlorophyceæ, Phaeophyceæ). Siboga Monog. 59a (1913) 186 pp., 5 pls.

81. Wittrock, V. B. Forsok till en monographie ofver algslagtet Monostroma. Akad. Afh. (1866) 66 pp.

82. Yamada, Y. Studien uber die Meeresalgen von der Insel Formosa, I. Chlorophyceæ. Bot. Mag. Tokyo (460) 39 (1925) 77–95.

83. Yamada, Y. The marine Chlorophyceæ from Ryukyu, especially from the vicinity of Nawa. Journ. Fac. Sci., Hokkaido Imp. Univ. (2) 3 (1934) 33–88.

84. Yamada, Y. [Species of Halimeda in the South Sea.] Kagaku Nanyo [Sci. South Sea]. (2) 4 (1941) 108–121, figs. 1–15.

85. Yendo, K. Notes on algæ new to Japan, II. Bot. Mag. Tokyo (333) 28 (1914) 263–281.

86. Zanardini, G. Phyceae papuanae novae vel minus cognitae a cl. O. Beccari in itinere ad Novam Guineam annis 1872–75 collectae Nuova Giorn. Bot. Ital. 10 (1878) 34–40.

ILLUSTRATIONS

PLATE 1

(*Anadyomene espetata* Gilbert, sp. nov.)

FIG. 1. Surface view of part of a very young frond showing the pattern of the primary cells or veins; × 17.

2. Surface view of the middle area of an older frond, showing the veins pattern; × 17.

3. Surface view near the margin of an older frond, showing the pattern of veins; × 171.

4. Transverse section from the lower part of a frond; the main veins are marked by (v); × 102.

5. Surface view of the margin of a frond, showing detail of primary branches and interstitial cells; × 50.

6. Surface view of the lower part of a frond, showing the detail of veins and interstitial cells; × 50.

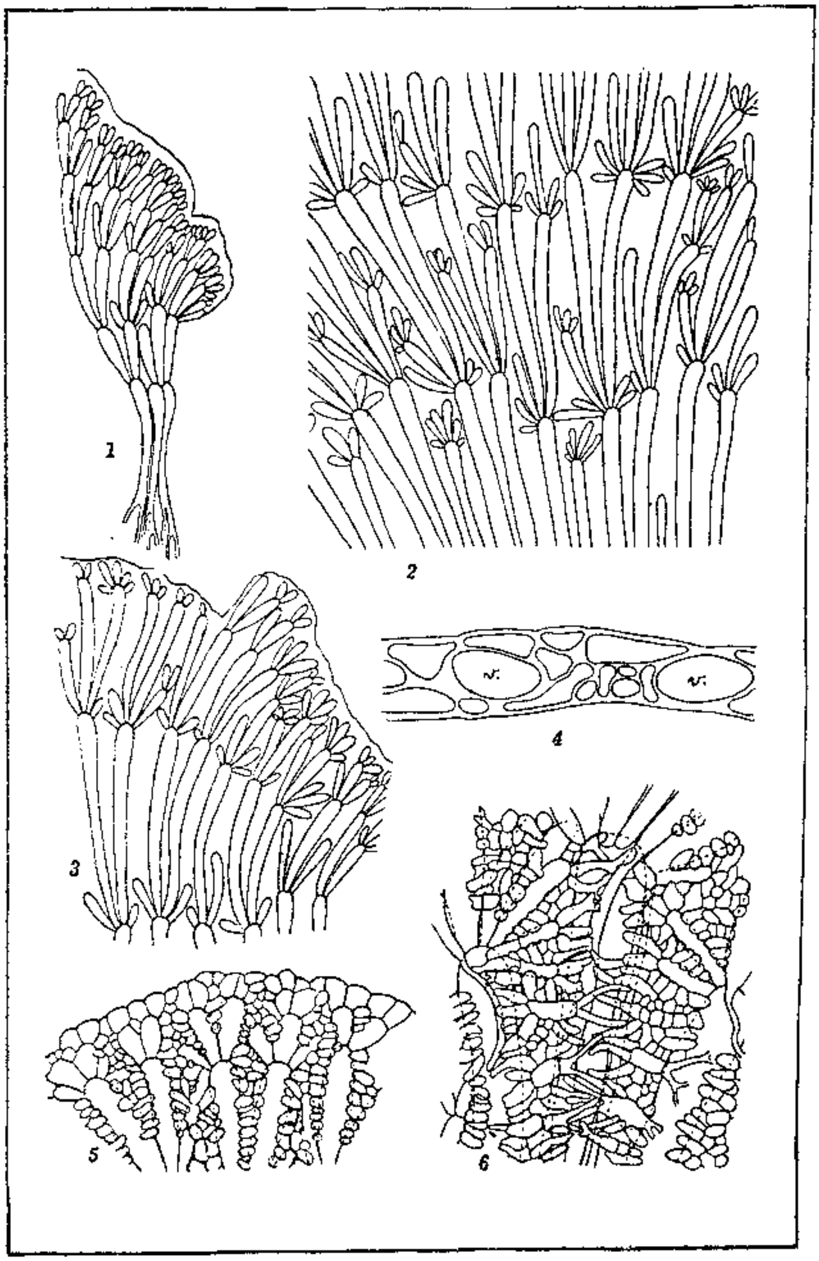

PLATE 1.

JAPANESE PSYCHODIDÆ, V *

DESCRIPTIONS AND REVISIONS ON THE JAPANESE SPECIES OF THE GENERA TRICHOPSYCHODA, PERICOMA, TELMATOSCOPUS, BRUNETTIA, AND TRICHOMYIA

By Masaaki Tokunaga

Entomological Laboratory, Saikyo University, Kyoto, Japan

EIGHTY-FOUR TEXT FIGURES

At present fifty-one determined species of Japanese Psychodidæ may be enumerated, of which forty species have been previously reported in a series of papers by Mrs. Etsuko Murachi Komyo and myself.[1] In this paper, the last of the series, eleven species of the genera *Trichopsychoda, Pericoma, Telmatoscopus,* and *Brunettia,* which are new to science, are described. To supplement our previous reports, data obtained from a re-examination of additional materials have been included.

The type specimens are mounted in Gater's solution or pinned and dried and are all deposited in the entomological laboratory, Saikyo University.

I am heavily indebted to Dr. T. Esaki for his valuable suggestions and for making available the necessary literature. I wish to express my sincere thanks to Drs. P. Arnaud, S. Ito and T. Shiraki and to Messrs. N. Fukuhara, H. Hasegawa, S. Kato, M. Kubota, T. Shirozu, and T. Yano for the privilege of studying the valuable material; to Mr. Sasakawa for the useful help given; and to Mrs. E. Murachi for preparing this paper. My deepest thanks also go to Miss T. Ito for drawing the text figures.

Subfamily PHLEBOTOMINÆ

Phlebotomus squamirostris Newstead is the only known species of this subfamily. Systematic details and literature related to this species have been reported by Etsuko Komyo and myself in 1954.[2]

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* Contribution from the Entomological Laboratory, Saikyo University, Kyoto, No. 53.

[1] Philip. Jour. Sci. **83** (1954) 307–317, 401–417; **84** (1955) 205–228; **86** (1957) 359–403.

[2] Japanese Jour. Sanit. Zool. **5** (1954) 9–15.

Subfamily TRICHOMYIINÆ

Genus TRICHOMYIA Haliday

TRICHOMYIA ITOCOÆ Tokunaga et Etsuko.

T. itocoæ TOKUNAGA ET ETSUKO, Philip. Jour. Sci. 84 (1955) 206–208.

A rather small pale brownish gray species described from one male specimen collected by Mrs. Ito Shinoda T. from Ise District. Another male specimen was collected from Kanagawa Prefecture.

A new specimen is very closely similar to the type, but slightly larger, wings being about 1.56 mm by 0.66 mm and more or less different in the following measurements: Eyes separated above from each other as wide as four facets. Maxillary palpi with three segments in proportion of 17:15:17. Legs with segments from femora to tarsi about 113:123:76:34:26:18:20 in fore, 137:140:81:35:26:17:20 in middle and 140:180:85:37:27:18:20 in hind leg in relative length. Wings with R_1, R_{2+3} and R_2 in proportion of 75:24:60 and M_{1+2}, M_{3+4}, M_3, M_4 and Cu_1, about 27:9:72:53:43.

Specimen.—Male; Ohiso, Kanagawa Prefecture, Honsyu; May 18, 1942 (*H. Hasegawa*, at light).

Distribution.—Honsyu, Japan.

This genus has only one species in Japan and at present the female is not known.

Genus SYCORAX Haliday

S. nipponicus Tokunaga et Etsuko (1955) is the only known species from Japan and reported in Part II of this series.

Subfamily PSYCHODINÆ

Genus PSYCODA Latreille

Nineteen species have been reported since 1954 from Japan by myself and Etsuko K. appearing in Parts I, III, and IV of this series. Besides these determined species there is an undetermined species which was labelled as Jp.–No. 1 in Part IV.

Genus TRICHOPSYCHODA Tonnoir

Key to the Japanese species of Trichopsychoda

1. Wing with radial and median forks or one of them complete .... 2.
   Wing with both radial and median forks incomplete .... 4.
2. Wing with radial fork complete, but median fork incomplete. In female, subgenital plate with caudal lobes far shorter than wide and spormathecæ quite smooth on surface (Male unknown).
   T. ozensis sp. nov.

Wing with both radial and median forks complete .... 3.

3. Wing vein R arising distinctly beyond origin of R_5; R_3 distinctly shorter than Cu_1 (36:46) (Male unknown).
T. lepida Tokunaga et Etsuko.

Wing vein R_{2+3} arising from same level to origin of R_5; R_3 subequal in length to Cu_1 (46:46) (Female unknown).
T. okinawensis sp. nov.

4. Wing vein R_3 very short and about a quarter of M_2 or shorter (Male, 1:3.9 to 4.8 and female, 1:4 to 4.2 .... *T. arnaudi* sp. nov.

Wing vein R_3 not so short and at least about two-thirds of M_2 (1:2.3 to 2.6) (Male unknown) .... *T. shogakii* Tokunaga et Etsuko.

TRICHOPSYCHODA LEPIDA Tokunaga et Etsuko.

T. lepida TOKUNAGA et ETSUKO, Philip. Jour. Sci. **83** (1955) 410–411.

This is quite peculiar in wing venation of radial field for the genus and in structure of female subgenital plate and asymmetrical arms of antennal ascoids.

TRICHOPSYCHODA SHOGAKII Tokunaga et Etsuko.

T. shogakii TOKUNAGA et ETSUKO, Philip. Jour. Sci. **83** (1954) 408–410.

A medium-sized dark gray species, described from females collected by Mr. Y. Shogaki at Kyoto. Five female specimens were found again from Japan and in this time the original description is supplemented with the following notes of the subgenital plate and spermathecæ: Subgenital plate (Fig. 1) with basal part semicircular and caudal part setigerous, almost as long as wide, its lateral sides almost parallel and two caudal lobes short, blunt at apices and separated from each other by a V-shaped caudal incision. Spermathecæ rather large, short-oval and very finely straitened on lateral sides.

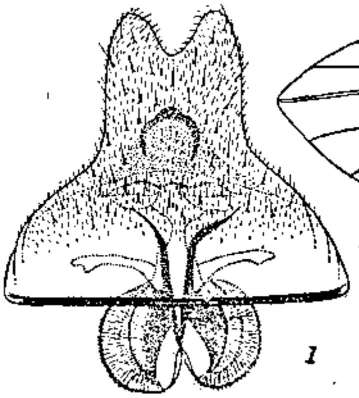
Specimens.—A female; Mt. Kuzyu, Fukuoka Prefecture; July 17, 1943 (*S. Ito*). A female; Ohiso, Kanagawa Prefecture; May 18, 1947 (*H. Hasegawa.*) A female; Mt. Iwawaku, Osaka Prefecture; September 15, 1950 (*S. Ito*). Two females; Mt. Hiko, Fukuoka Prefecture; one on July 17, 1943 by S. Ito and one on July 22, 1955 by T. Esaki.

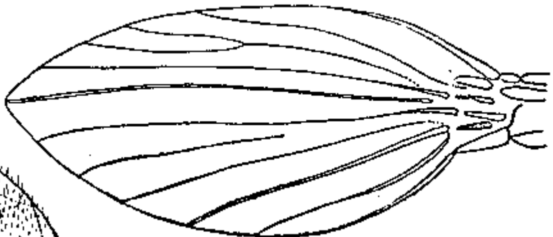
Distribution.—Honsyu and Kyusyu, Japan.

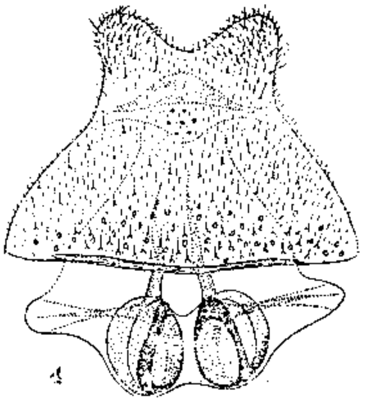
The male specimens are quite unknown as yet.

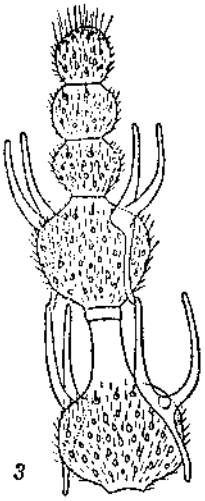
TRICHOPSYCHODA OZENSIS sp. nov.

A rather large dark species. Antennæ 16-segmented, with ascoids Y-shaped and present on segments 3 to 13, distal three segments all separated by joints as in other species of the genus. Wings with radial fork complete, but median fork incomplete, M_2 being narrowly atrophied at base. Female sub-









Trichopsychoda shogakii Tokunaga et Etsuko (Female)
FIG. 1. Subgenital plate with spermathecæ.

Trichopsychoda ozensis sp. nov. (Female)
FIG. 2. Wing; 3, apical segments of antenna; 4, subgenital plate with spermathecæ.

genital plate shorter than basal wide, with caudal part very short and its lobes as long as wide, round at tip and widely separated from each other by a shallow but broad caudal incision; spermathecæ short-oval, rather large and without sculpture on surface.

Female.—Body, about 2.4 mm long. Wings, about 2.47 mm by 1.04 mm. Vestiture almost entirely dark.

Head with eyes narrowly separated above as wide as a facet from each other and eye-bridge[3] small and inverted Y-shaped. Maxillary palpi with four segments in proportional

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[3] Internal thickening between paired compound eyes on ventral part of vertex.

length of 23 : 39 : 46 : 55. Antennæ (Fig. 3) 16-segmented, with ascoids rather short, Y-shaped and present on segments 3 to 13; neck parts developed on segments 3 to 12 but shorter than basal nodes; distal three segments distinctly separated by joints, subequal, with many verticils; penultimate two somewhat discoidal and without sensory cones; last one almost spherical, as large as preceding two and with many hyaline sensory setæ at tip; relative lengths of distal eight segments about 28 : 26 : 26 : 24 : 16 : 8.5 : 8.5 : 9.5.

Legs with femora, tibiæ and five tarsal segments in proportion of 140 : 151 : 71 : 31 : 26 : 22 : 25 in fore, 155 : 205 : 78 : 32 : 29 : 23 : 26 in middle and 170 : 260 : 87 : 34 : 30 : 22 : 27 in hind leg. Wings (Fig. 2) with R_1 ending at level of tip of M_4, radial fork complete, median fork incomplete, relative lengths of R_1, M_4 and Cu_1 about 95:102:75, R_{2+3} a little longer than R_3 (64:60) and about 1.5 times as long as R_2 (64:44), M_2 about 1.3 times as long as R_3 (80:60).

Subgenital plate (Fig. 4) shorter than basal width (40:69), with basal part semicircular and scaly basally, caudal part not strongly constricted at base, bilobated into short and blunt lobes which are separated widely by a shallow caudal incision, internal plate with seven minute punctures. Spermathecæ rather large, short-oval, each with four chitinized arms and without sculpture on surface. Ovipositor rather short, about 1.7 times as long as subgenital plate (68:40) and almost entirely yellow.

Male.—Unknown.

Holotype.—Female; Oze Marsh, Gumma Prefecture; July 21, 1951 (*H. Hasegawa*).

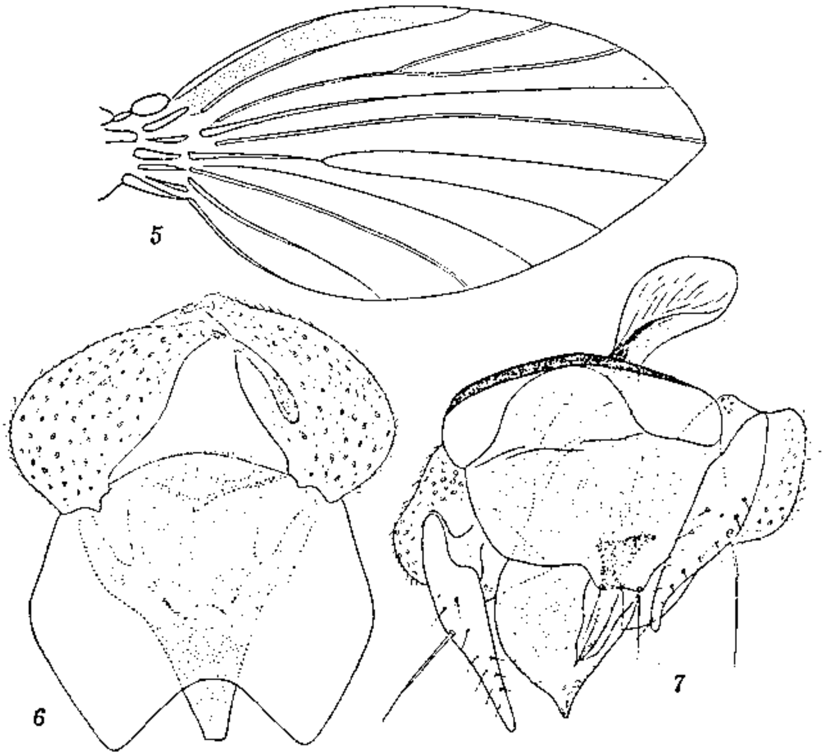
Locality.—Honsyu, Japan.

This species is different from the known *Trichopsychoda* species in possession of characteristic wing venation: radial fork complete and median fork incomplete. The structure of the subgenital plate is somewhat allied to *T. hirtella* Tonnoir but in the allied species the constriction at base of caudal part is deeper and the internal plate forms a round caudal projection between the caudal lobes differing from the present species.

TRICHOPSYCHODA OKINAWENSIS sp. nov.

A medium-sized black species. Antennæ with usual neck parts and well developed Y-shaped ascoids. Wings rather broad in male, with radial and median forks complete, costal cell dark, R_1 ending just before tip of R_4, radial fork far beyond median fork and at level of tip of Cu_1 or slightly beyond it. Male hypopygium *Psychoda-type*, with cerci shorter than ninth tergite and strongly swollen except for only apical part and with a long retinaculum at each tip; styles conical, not strongly curved, not scaly, each with a rather long seta at middle; ædeagus very large, broad, but apodeme not so large as ædeagus, with paramere rather slender, sharply pointed and only slightly arcuated closely along dorsal side of ædeagus.

Male.—Body length, about 2.02 mm. Wings, about 1.62 mm by 1 mm. Vestiture almost entirely black.



***Trichopsychoda okinawensis* sp. nov. (Male)**

FIG. 5. Wing; 6, ninth tergite with cerci; 7, dorsal aspect of sternal parts of hypopygium.

Head with eyes narrowly separated above as wide as a facet from each other and eye-bridge double, =-shaped, but very fine. Four maxillary palpal segments in proportion of 19 : 32 :

42 : 66. Antennæ broken off remaining basal three segments; first segment subcylindrical and longer than wide (41:26) second spherical (23:22), third normal (30:22), with well developed Y-shaped ascoids and a rather short neck part.

Legs with main segments, except for basal two, about 133 : 128 : 52 : 22 : 22 : 20 : 27 in fore, 159 : 163 : 87 : 30 : 23 : 20 : 27 in middle and 160 : 232 : 75 : 26 : 23 : 20 : 28 in hind leg in relative length. Wings (Fig. 5) rather broad, without scales on veins and membrane, uniformly brownish fuscous on membrane, but veins and costal cell more brownish. Venation: R_1 ending just before tip of M_1, radial and median forks complete, the former far beyond latter and located at level of tip of Cu_1 or slightly beyond it, R_5 ending at pointed wing tip, R_{2+3} about one and one-third as long as M_{1+2} (52:39), R_3 longer than R_{2+3} and as long as Cu_1, R_2 about 0.8 of R_{2+3} (40:52), M_2 about twice as long as M_{1+2} (76:39).

Hypopygium (Figs. 6 and 7) with ninth tergite hexagonal and wider than long (60:50); cerci shorter than tergite (41:60); stout, strongly swollen except for small conical apices, entirely scaly and each with a simple long retinaculum at tip which is about half as long as cercus (21:41); ninth sternite very broad, basal chitinized part transverse, widely separated into hemisternites by a caudal semicircular membrane and quite bare, caudal membranous area very broad, with a small caudal projection which bears about three marginal setæ; coxites stout, a little shorter than wide (15:19) and scaly on lateral sides; styles conical, about twice as long as coxites (30:15), with scattered minute sensory setæ and single rather long setæ at middle and without scales; ædeagus very broad, suddenly pointed at caudal tip, with apodeme far shorter than ædeagus and paramere about half as long as ædeagus, slender, sharply pointed and slightly arcuated closely along ædeagus.

Female.—Unknown.

Holotype.—Male; Naha vicinity, Okinawa Island, Japan (*P. Arnaud*, at light).

Locality.—Okinawa, Ryukyu Islands, Japan.

This species has a typical male hypopygium for the genus *Psychoda*, the cerci being not provided with specialized hairs, differing from the other members of *Trichopsychoda*, but the wings are entirely hairy on veins and membrane as in *Trichopsychoda*. The antennæ are provided with typical flagellar segments: Y-shaped ascoids, cylindrical neck parts and basal nodes are well developed, although their apical segments are missing unfortunately, differing from the majority of *Brunettia* species.

TRICHOPSYCHODA ARNAUDI sp. nov.

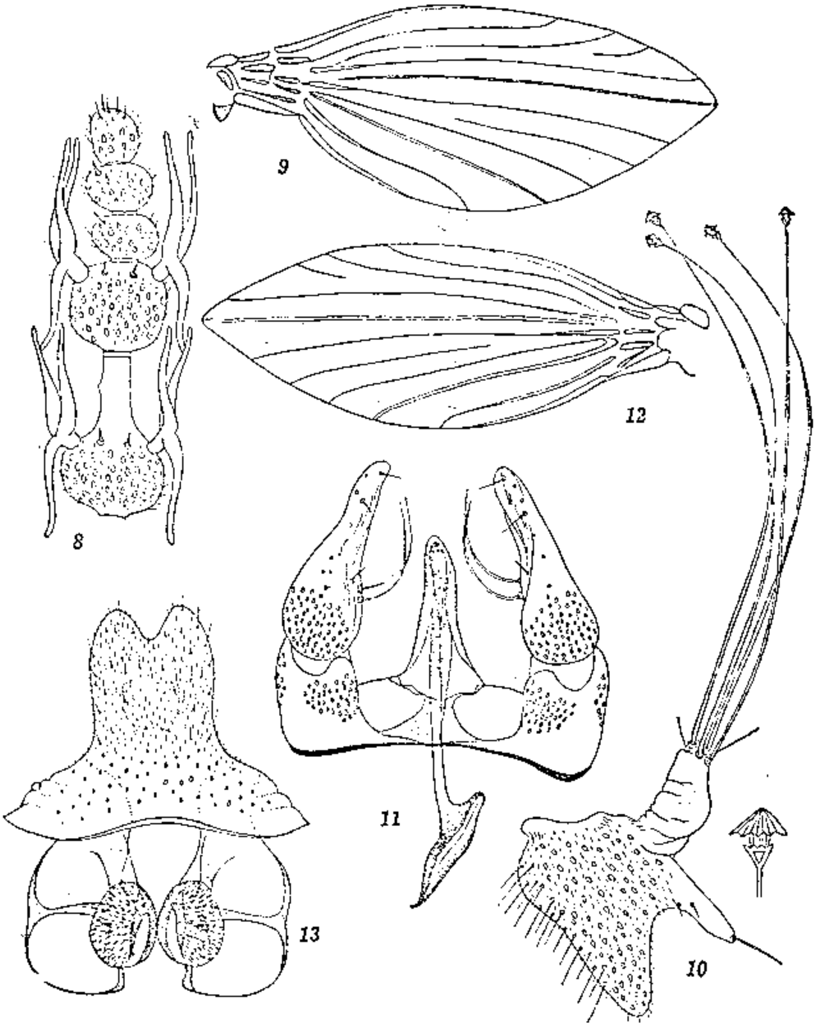
A rather large dark gray species, rather abundant on Okinawa Island. Antennæ 16-segmented as in other species or the genus and with neck parts on segments 3 to 12 and well developed Y-shaped ascoids on segments 3 to 13; last three segments smaller, subequal and with verticils. Wings with R_1 ending slightly before or above tip of M_4, radial and median forks incomplete, R_3 very short being only 0.23 as long as M_2 in male and 0.25 in female. Male hypopygium with ninth tergite far longer than wide and peculiar cerci which have three projections: ventral projection subtriangular and scaly, dorsal projection fingerlike and with four very long hairlike retinacula each of which terminates into a laternlike nodule and middle projection slender and with a small terminal seta. Female subgenital plate closely similar to that of *T. shogakii* Tokunaga et Etsuko, but spermathecæ only very finely sculptured on surface.

Male.—Body length, about 1.95 mm. Wings, 1.83 mm by 0.73 mm. Vestiture almost uniformly dark gray.

Head with eyes very narrowly separated above hardly as wide as a facet from each other and with eye-bridge inverted Y-shaped with rather long stem; frontal scaly area subcordiform or suboval. Maxillary palpi with four segments in proportion of 25.7 : 35.7 : 43 : 45. Antennæ (Fig. 8) 16-segmented, with neck parts a little shorter than basal nodes and present on segments 3 to 12, ascoids well developed, Y-shaped and present on segments 3 to 13, scape and pedicel subspherical; thirteenth segment subspherical and as large as basal node of preceding segment; following two segments discoidal, subequal, far smaller than preceding, with many verticils and each with a minute cone; ultimate oval slightly longer than preceding two or width, with several apical minute sensory setæ and verticils; these terminal small segments distinctly separated from each other by joints; relative lengths of distal eight segments about 27.5 : 27.5 :26.3 : 24 : 13.8 : 6.3 : 6.3 : 8.

Legs with femora ,tibiæ and five tarsal segments in proportion of 134 : 135.5 : 60.5 : 21.5 : 19 : 17 : 22 in fore, 136 : 176.5 : 78 : 25 : 20 : 18 : 22.5 in middle and 151 : 217.3 :

82.3 : 27.3 : 21.7 : 19.3 : 24.3 in hind leg. Wings (Fig. 9) with very narrow scales on veins and membrane, R_1 ending slightly before or above tip of M_4, radial and median forks incomplete, R_5 ending at wing tip, R_3 very short and about 0.23 of M_2 (13.3:57) and the latter about as long as Cu_1.



Trichopsychoda arnaudi **sp. nov.**

FIG. 8. Apical segments of male antenna; 9, male wing; 10, lateral aspect of male cerci and apical end of retinaculum; 11, dorsal aspect of sternal parts of male hypopygium; 12, female wing; 13, female subgenital plate with spermathecæ.

Hypopygium (Figs. 10 and 11) with ninth tergite far longer than basal widest part (75:60) elongated, subsquare and its lateral sides almost parallel; cerci highly specific, short, about two-fifths as long as tergite, subtriangular, scaly on lateral sides and with two dorsal projections: basal projection about two-thirds as long as cercus (19:30), fingerlike, extending backwards and with two small apical setæ and four or five hairlike very long retinacula at tip which are fully as long as ninth tergite and each terminates in a minute nodule reminiscent of an old lantern and another additional projection conical, rather slender, a little shorter than basal one (14:19), extending straightly dorsocaudad and with a small apical and two minute sub-basal setæ. Ninth sternite obliterated; coxites fused with each other by a basal thickened rib, cylindrical, a little longer than wide (38:35) and scaly on dorsal and lateral sides; styles far larger than coxites (57.38) or cerci (57:30), swollen on basal half and scaly on basal one-third, tapered, not sharply pointed apically and with several scattered minute setæ and punctures and two rather long setæ before middle. Ædeagus slender, almost straight, round at tip, with sheath conical and hardly as long as styles, with apodeme rather short, but broad vertically and without distinct paramere.

Female.—Body, about 1.97 mm long. Wings, about 1.86 mm by 0.72 mm. General structure closely as in male except for usual sexual differences.

Head with four segments of maxillary palpi in proportion of 25 : 33 : 40.7 : 41.7. Wings (Fig. 12) narrower and more sharply pointed than in male, with slender hairs instead of delicate scales of male wings; relative lengths of wing veins R_3, R_5 and M_2 about 14.3 : 113.7 : 58.3. Hind leg with segments excepting basal two in proportion of 133 : 204 : 78 : 27 : 22 : 18 : 20. Subgenital plate (Fig. 13) shorter than basal wide closely similar to *T. shogakii* Tokunaga et Etsuko, but its basal part smaller and more scaly and its caudal part a little longer than wide (36:34.5); spermathecæ short-oval, with very fine sculpture on surface and three thickened ribs on each accessory plate; ovipositor normal.

Holotype.—Male; Naha vicinity, Okinawa, Ryukyu Islands; February 12, 1955 (*P. Arnaud*, by light trap).

Allotype.—Female, collected with holotype.

Paratypes.—A male and two females, collected with holotype and a male at same place on February 9, 1955, by P. Arnaud.

Locality.—Ryukyu Islands, Japan.

This species is quite specific in structure of the male hypopygium, but the female is closely allied to *T. shogakii* except for slight differences of the subgenital plate and spermathecæ.

Genus **PERICOMA** Walker

At present there are five species new to science which are added to eight known species.

Key to the Japanese species of Pericoma

MALES

1. Wing with basal backward projection of vein at basal angle of M$_2$ 2.
Wing without basal backward projection of vein on basal part of M$_2$ 5.

2. Basal backward projection of wing vein M$_2$ long and connected with basal part of M$_3$; style of hypopygium bifurcated.
P. furcastyla Tokunaga et Etsuko.
Basal backward projection of wing vein M$_2$ short and ending freely; style of hypogygium not bifurcated .... 3.

3. Third antennal segment quite simple and without special strong spines or scaly projection. Style of hypopygium with ventral blunt tubercle which bears two strong spines.
P. furcastyla Tokunaga et Etsuko.
Third antennal segment with special strong spines or scaly projection 4.

4. Several basal flagellar segments of antenna each with a large scaly projection (Female unknown) .... *P. decoricornis* sp. nov.
One or two basal flagellar segments of antenna with special strong bristles or spines, but without scaly projection. Styles and cerci of hypopygium only slightly arcuated (Female unknown).
P. spinicornis sp. nov.

7. Third antennal segment about twice as long as fourth .... 8.
Third antennal segment without special strong spines or bristles.... 10.

6. Third and fourth antennal segments more or less united and both with strong spines (Female unknown)...... *P. canisquamata* sp. nov.
Third and fourth antennal segments quite separated by joint and fourth without strong spines .... 7.

7. Third antennal segment about twice as long as fourth .... 8.
Third antennal segment subequal in length to fourth .... 9.

8. Style of hypopygium with a denticulated dorsal ridge and cerci with retinacula on apices .... *P. denticulatistyleta* Tokunaga et Etsuko.
Style of hypopygium simple, without denticulated ridge and cerci with retinacula on pre-apical part .... *P. yanoi* Tokunaga et Etsuko.

9. Third antennal segment not distinctly flattened on one side, with five strong spines and not extended beyond joint for following segment; ædeagus slender and cylindrical (Female unknown).
P. itoi sp. nov.
Third antennal segment distinctly flattened on one side, with three strong spines and extended beyond joint for following segment: ædeagus stout and somewhat oval.
P. sasakawai Tokunaga et Etsuko.

10. Style of hypopygium with only three retinacula.
P. shikokuensis Tokunaga et Etsuko.
Style of hypopygium with five or six retinacula .... 11.

11. Wing with vein Cu_1 ending at level of radial and median forks.
P. reticulatipennis Tokunaga et Etsuko.
Wing with vein Cu_1 ending beyond level of radial and median forks.
P. subnubilis sp. nov.

FEMALES

1. Wing with basal cell very long being at least thrice as long as distal width (Male unknown) .... *P. longicellata* Tokunaga et Etsuko.
Wing with basal cell rather short being at most one and half as distal width .... 2.

2. Wing with basal backward projection of vein at basal angle of vein M_2 3.
Wing without basal backward projection of vein on basal part of vein M_2 .... 4.

3. Backward projection of wing vein M_2 connected with base of M_3; spermathecæ very small, round and with large neck-parts.
P. furcastyla Tokunaga et Etsuko.
Backward projection of wing vein M_2 short and ending freely; spermathecæ elongated, oval and with slender neck-parts.
P. omogoensis Tokunaga et Etsuko.

4. Wing with fringe all dark brown except for extreme base.
P. yanoi Tokunaga et Etsuko.
Wing with white or paler tuffs of fringe at least at apical part .... 5.

5. Wing margin between tips of veins M_1 and Cu_1 without white or paler tufts of fringe .... 6.
Wing margin between tips of veins M_1 and Cu_1 with white or paler tufts of fringe .... 8.

6. Wing with only several small tufts of white scales on veins; these white small tufts scattered .... P. sasakawai Tokunaga et Etsuko.
Wing with many large tufts of white hairs on veins; basal white large tufts forming a white band before level of median and radial forks .... 7.

7. Wing with radial fork located before level of median fork.
P. subnubilis sp. nov.
Wing with radial and median forks located on same level.
P. reticulatipennis Tokunaga et Etsuko.

8. Third tarsal segments of fore and hind legs entirely white; subgenital plate with caudal incision slightly convex at bottom.
P. reticulatipennis Tokunaga et Etsuko.
Third tarsal segments of fore and hind legs dark and narrowly white at both ends; subgenital plate with caudal incision evenly concave .... *P. shikokuensis* Tokunaga et Etsuko.

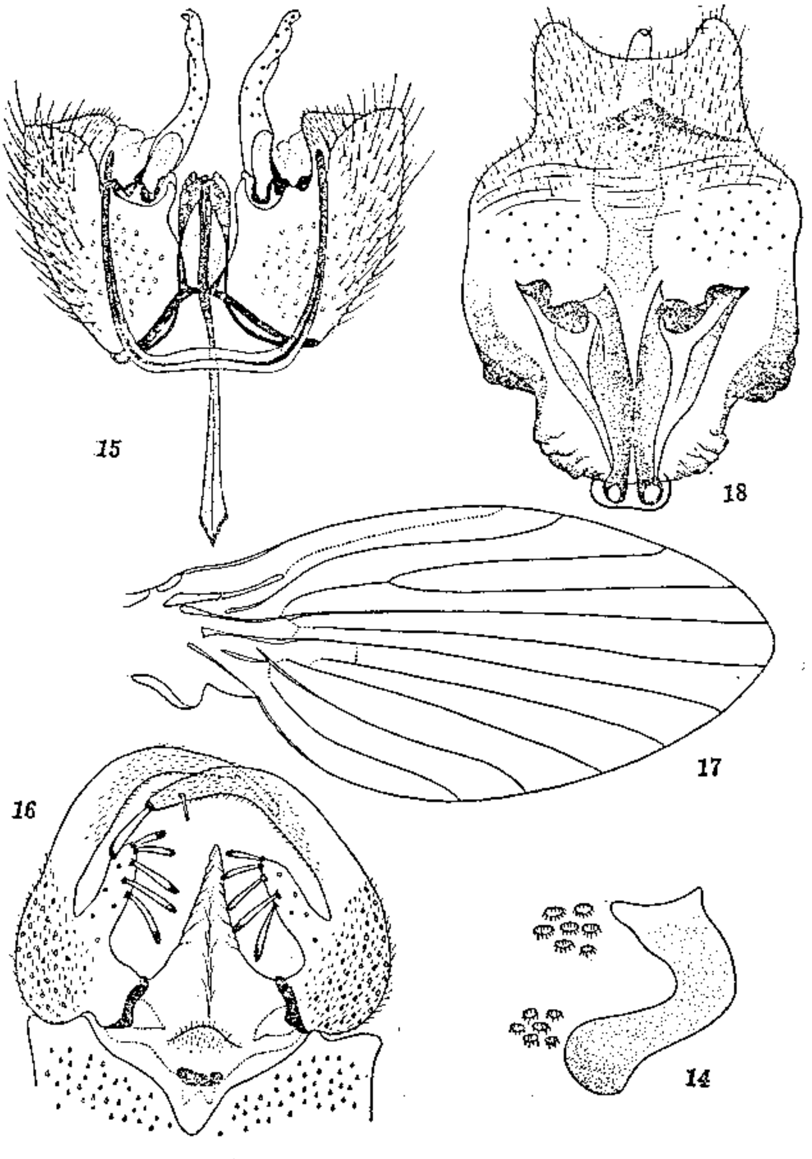
PERICOMA FURCASTYLA Tokunaga et Etsuko.

P. furcastyla TOKUNAGA et ETSUKO, Philip. Jour. Sci. 84 (1955) 225–227.

A rather large species, with wings mottled appearance and fringed with yellowish white hairs on apical margin. In male, as already pointed out in original description as specific characters, two basal flagellar segments fused with each other and with very strong bristles, wing vein M_2 prolonged backwards beyond basal section or median fork and connected with base of M_3, coxites of hypopygium very broad and with styles on pre-apical mesal sides and far slender, cerci bifurcated into a slender long lobe which bears a retinaculum and a short dorsal lobe which bears five retinacula. In female, wing venation as in male, subgenital plate far longer than wide, but distal part small, transverse, about half as long as wide and with caudal lobes very short, round apically and very widely separated from each other by a wide but shallow caudal incision; spermathecæ very small, round, smooth on surface and each with a strong funnel-like chitinized structure.

The original description is supplemented and corrected with the following results of re-examination on the male and the new description on the female.

Male.—Body length, about 2 to 3 mm. Wings about 2.8 to 3.3 mm by 1.5 to 1.6 mm. Head with eye-bridge inverted Y-shaped. Antennæ with first and second flagellar segments united with each other, but these two segments shown by a shallow constriction, the former part with four or five strong black spines arranged in a longitudinal line and the latter part with one or two strong black spines and sometimes with an accessory small bristle. Prothorax with a pair of rather long protuberances (Fig. 14) on pleural sides which are membranous, cylindrical, round at apices and with numerous minute pores. Wings sometimes with white marking more obscure than in original description; venation: R_1 ending beyond or above tip of M_4, radial fork more or less beyond median fork, relative lengths of R_1, M_4 and Cu_1 about 125 : 124 : 98, those of R_{2+3} $_2$ and R_3 about 46 : 115 : 136 and those of M_{1+2} and M_2 about 35 : 141. Hypopygium (Figs. 15 and 16) with caudal lobe of ninth tergite triangular, sharply pointed and chitinized; cerci unequally bifurcated into a long curved ventral lobe which bears an apical retinaculum and a pre-apical small spine and into a short fingerlike dorsal lobe which bears three or rarely two apical and two pre-apical retinacula; coxites broad, about 1.6 times as long as wide (90:58), about half as long as cerci (192:90), scaly on dorsal sides and setigerous on lateral sides; styles arising from preapical mesal parts of coxites, far shorter than coxites (69:90), with scattered minute punctures and without hairs, scales or pubescence; ædeagus and apodeme slender, almost straight and total length of these two parts about twice as long as styles (140:69), parameres two, sym-



Pericoma furcastyla **Tokunaga et Etsuko**

FIG. 14. Male allurement organ; 15, dorsal aspect of sternal parts of male hypopygium; 16, ventral aspect of male cerci; 17, female wing; 18, female subgenital plate with spermathecæ.

metrical, with basal parts very slender and apical half broadened and extending closely along sheath of ædeagus which is half as long as coxites and ending far before tips of coxites; an U-shaped large but slender chitinization on under side of paired coxites. Other characters as in original description.

Female.—Body, 3.5 to 3.8 mm long. Wings, about 3.6 to 3.73 mm by 1.64 to 1.73 mm. Coloration somewhat darker than in male; hairs of antennæ gray, thorax with dark gray hairs on dorsal central part and white gray hairs on lateral sides, legs with black hairs entirely, wings with white hairs scattered on apical half, more dense erect white hairs on basal half and white marking more obscure than in male and abdomen with dark gray hairs.

Head with eyes separated above as wide as two facets and eye-bridge inverted V-shaped. Maxillary palpi with four segments in proportion of 32.5 : 67.5 : 65 : 97.5. Antennæ 16-segmented, with scapes cylindrical and about twice as long as wide (42.5:23.5), pedicels spherical (21 × 21), first flagellar segments in allotype a little longer than pedicels (25:22) and fusiform but in a paratype shorter than pedicels (95:20) and oval, following three segments in proportion of 15 : 14.5 : 14.5, distal five segments about 14.3 : 14 : 11.3 : 10.5 : 16, ultimate segment with a club-shaped apical process which is as long as basal node.

Legs with femora, tibiæ and five tarsal segments in relative length of 48 : 55 : 26 : 9.5 : 7 : 5.5 : 7 in fore, 54 : 70.5 : 31.5 : 10.5 : 7 : 5.5 : 7.5 in middle, and 58 : 81.5 : 33.5 : 10.5 : 8 : 6 : 8 in hind leg. Wings (Fig. 17) with median fork under apical one-third or one-fourth of R_{2+3}, R_{2+3} and R_2 in proportion of 47 : 114, basal section of M_2 cross-veinlike and obscure, bases of R_5, M_3 and Cu_1 obscure.

Subgenital plate (Fig. 18) far longer than wide, its basal part very broad, with a chitinized basal broad process and scaly on distal area; caudal part setigerous, pubescent, far shorter than wide (24:43), transverse and with paired caudal lobes very small, round apically and very widely separated by a shallow but wide caudal incision from each other; a long thin plate and a small plate with several hyaline minute punctures found on dorsal side of subgenital plate; spermathecæ very small, round, without sculpture on surface and each with a funnel-like large chitinization on dorsal side of basal half of subgenital plate; ovipositor normal.

Allotype.—Female; Kamikochi (altitude, about 1,500 m), Nagano Prefecture; July 22, 1952 (*S. Ito*).

Paratypes.—A female with allotype and a male at Hatano, Kanagawa Prefecture, on April 12, 1955 by M. Sasakawa.

Distributon.—Honsyu and Hokkaido, Japan.

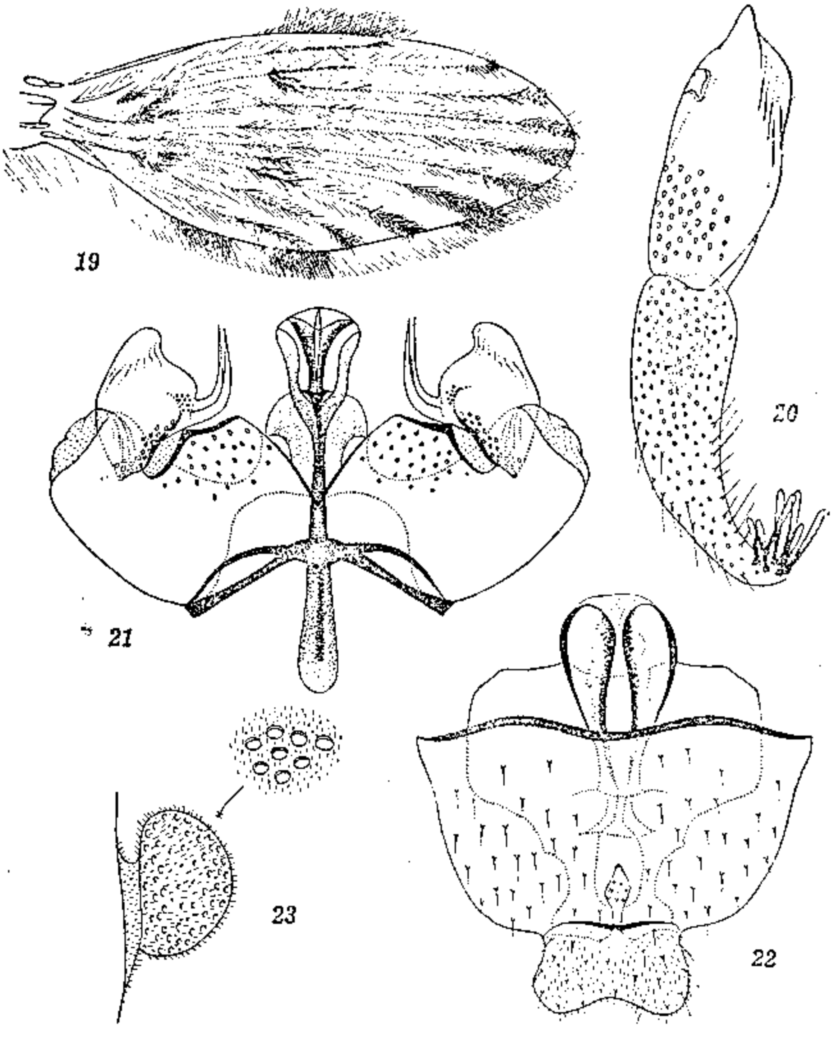
PERICOMA OMOGŒNSIS Tokunaga et Etsuko.

P. omogœnsis TOKUNAGA et ETSUKO, Philip. Jour. Sci. 83 (1954) 407–408.

The original description is supplemented and corrected with the more detailed studies on more perfect specimens mainly in relation of the coloration and genital structures.

Vesture of body mainly whitish gray, legs with coxæ to femora brown, tibiæ brownish yellow or pale yellowish white and distal ends black or dark brown, first tarsal segments white but often distal ends dark, distal four tarsal segments all black. Male with hemispheric thoracic tubercles (Fig. 23). Wings (Fig. 19) showing mottled appearance being provided with dark, whitish gray and brownish gray fringe and white, dark and black tufts of hairs on veins: dark tufts on veins around basal cell forming a rather dark spot on white wing base, dark and black tufts at middle of wing forming a broad dark band from apical part of R_1 to apical part of Cu_1, white tufts forming two bands before and beyond middle dark band, dark tufts of apical part each with a black spot at extreme end of vein; fringe mainly whitish gray, but dark at middle of costal margin before tip of R_1, brownish gray from before tip of M_1 to beyond tip of M_2, dark before and beyond tip of Cu_1 and at middle of caudal margin of cell Cu_1.

Male.—Hypopygium with ninth tergite subsquare and shorter than wide (63:71); cerci (Fig. 20) far longer than tergite (77:63) and not strongly curved at tips; coxites stout and longer than wide (70:60); styles short, subtriangualr in dorsal aspect and as long as basal wide (34:33); ædeagus rather short, broad, about half as long as coxites and ending far before apices of coxites, with basal apodeme very long, about 2.5 times as long as ædeagus (73:30) and broadened on apical two-fifths; parameres not developed (Fig. 21). Other characters as in original description.



Pericoma omogœensis **Tokunaga et Etsuko**

FIG. 19. Female wing; 20, lateral aspect of male cercus and ninth tergite; 21, dorsal aspect of sternal parts of male hypopygium; 22, female subgenital plate with spermathecæ; 23, male allurement organ.

Female.—Subgenital plate (Fig. 22) shorter than basal width (72:90), with basal part very broad and oval, caudal part narrowed basally, far shorter than basal or apical width (28: 35:50), with caudal incision very shallow, caudal lobes very short, round at apices and slightly divergent from each other;

a small chitinized plate with about ten minute punctures located on dorsal side of pre-apical narrowed part of the plate; a double-headed lobe arising from a V-shaped inner thickening of pre-apical narrowed part and extending slightly beyond caudal emargination; spermathecæ united into a rather cordiform body which are supported by a pair of large funnel-shaped chitinized structures and quite smooth on surface; ovipositor normal. Other structures as in original description.

Specimens.—A male; Kibune, Kyoto; April 22, 1932 (*M. Tokunaga*). Two males; Asiu, Kyoto Prefecture; April 27, 1952 (*M. Tokunaga*). Three females; Kibune, Kyoto; April 13, 1949 (*S. Ito*). A female; Minomo, Osaka Prefecture; March 31, 1951 (*S. Ito*).

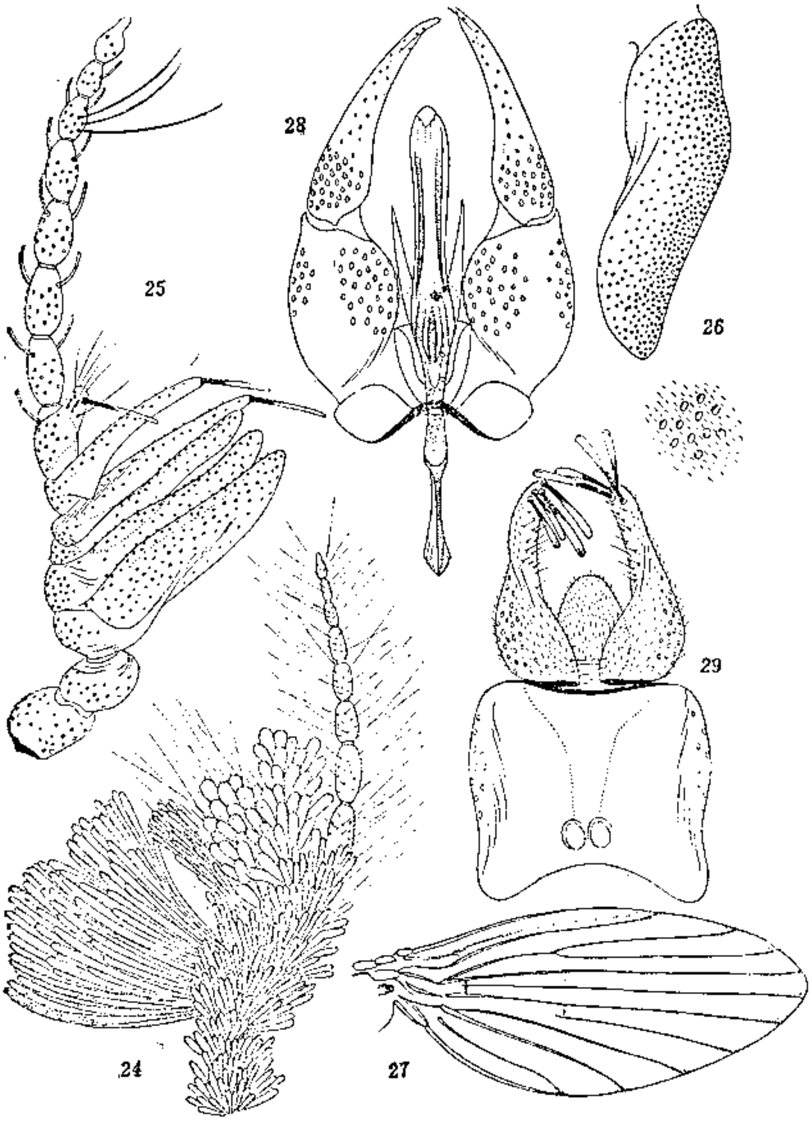
Distribution.—Shikoku and Honsyu, Japan.

PERICOMA DECORICORNIS sp. nov.

A rather large black and white species. Antennæ 16-segmented; basal six flagellar segments with peculiar lobes which are densely covered with black narrow and broad scales. Wings with dark tufts of hairs at tips of ten main veins and white fringe at tip of wing, R_{2+3} arising before origin of R_5, base of M_2 with a short backward prolongation, base of Cu_1, obscure. Cerci of male hypopygium as long as ninth tergite, tapered and each with four rather long apical retinacula; styles claw-like and ædeagus very long, far beyond tips of coxites and with two sharply pointed parameres.

Male.—Body, about 2.99 mm long. Wings, about 2.7 mm by 1.17 mm. Vesture of body mainly black, but white marking on wings and legs; scales generally well developed and broad.

Head with eyes constricted at bases of dorsal projections, narrowly separated above from each other as wide as half a facet, eye-bridge inverted T-shaped, but its dorsal stem double and frontal scaly area subsquare. Maxillary palpi with four segments in relative length of 25 : 45 : 46 : 56. Antennæ (Figs. 24 and 25) 16-segmented; six basal flagellar segments with peculiar lobes which are thickly covered with black long and broad scales; scape rather short and as long as wide; pedicel excentric, oval as long as scape; basal five flagellar segments intimately contiguous with each other, each with a long and large lobe which is very densely scaly and fourth and fifth segments each with a strong spine at tip of lobe; sixth flagellar



***Pericoma decoricornis* sp. nov. (Male)**

FIG. 24. Antenna with scales; 25, antenna denuded; 26, allurement organ; 27, wing; 28, dorsal aspect of sternal parts of hypopygium; 29, ventral aspect of ninth tergite and cerci.

segment covered with broad scales as in preceding segments, but its lateral projection rather small and with a strong preapical spine and several slender setæ; following segments normal, with setæ white-gray, without scales, oval, gradually decreasing in size; distad and ultimate segment with an apical process about half as long as basal node; relative lengths of distal seven segments about 20 : 20 : 17 : 17 : 14 : 11 : 15.

Thorax with a pair of somewhat flattened membranous projections above mesothoracic spiracles (Fig. 26). Legs with femora, tibiæ and five tarsal segments in proportion of 175 : 174 : 93 : 33 : 25 : 23 : 28 in fore, 183 : 204 : 105 : 40 : 27 : 20 :28 in middle and 198 : 267 : 116 : 40 : 27 : 20 : 28 in hind leg; coloration mainly black, but white on tibial ends and all tarsal segments. Wings (Fig. 27) mainly dark brown, with black tufts of hairs on apical ends of main veins, rather broad dark scales on veins of basal half, apical fringe white; venation: R_1 ending before tip of M_3, radial fork just before median fork which is at level of tip of Cu_1, M_2 with base obscure, angulated and with a very short backward prolongation, R_4 and R_5 ending before and beyond round wing tip, R_{2+3} arising before origin of R_5, Cu_1 not connected with M_{3+4}; relative lengths of R_1, M_3, M_4 and Cu_1 about 109 : 114 : 102 : 68, those of R_{2+3}, R_{4+5}, R_2 and R_3 about 45 : 10 : 90 : 115, those of M_{1+2} and M_2 about 63 : 90.

Hypopygium (Figs. 28 and 29) with ninth tergite as long as wide (65:64), subsquare and with rather large oval caudal lobe; cerci as long as tergite (64:65), rather swollen basally, tapered and each with four rather large apical retinacula and setigerous on apical half of dorsal side; coxites oval, longer than wide (55:30) and scaly on lateral and dorsal sides; styles clawlike, tapered, sharply pointed, far longer than coxites (63: 55), scaly on bases and with many scattered minute punctures; ædeagus very long, straight, far extending beyond tips of coxites, about twice as long as coxites (104:55) and apical part slightly clavated; apodeme of ædeagus slender and about one-third of ædeagus (35:104); parameres symmetrical, sharply pointed, slightly divergent caudad from each other and ending at level of tips of coxites.

Female.—Unknown.

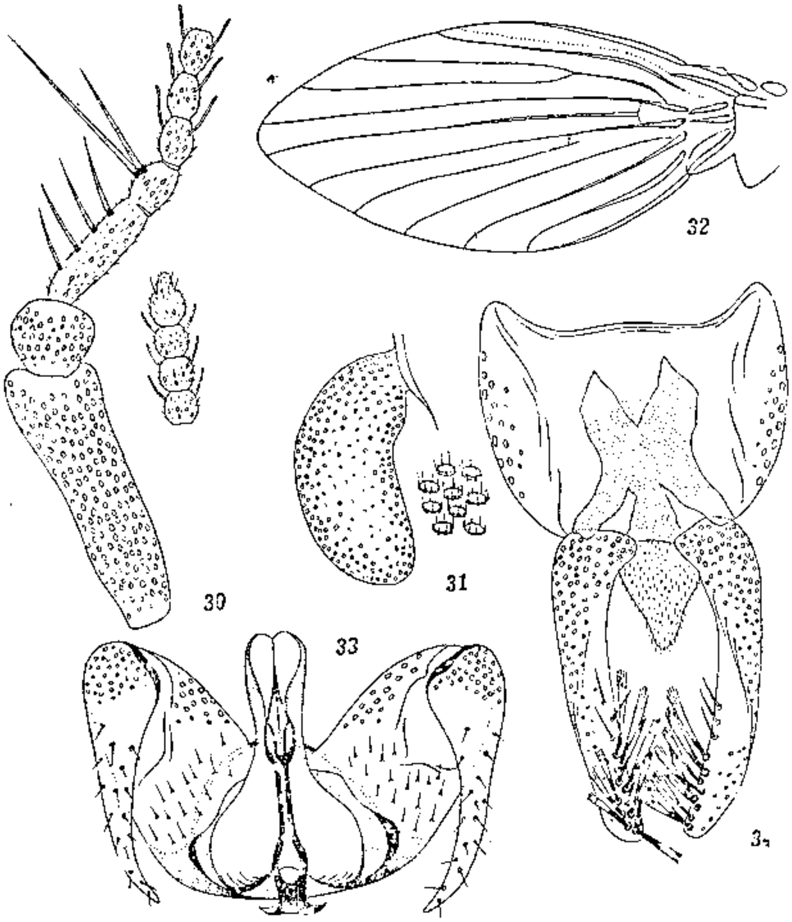
Holotype.—Male; Shimogamo, Kyoto; March 29, 1949 (*N. Fukuhara*).

Locality.—Honsyu, Japan.

This is quite peculiar and specific in the structure of the male antennæ, highly differing from all known *Pericoma* species.

PERICOMA SPINICORNIS sp. nov.

A medium-sized dark brown species. Antennæ 16-segmented, with first and second flagellar segments united partially and with very strong black spines as in *P. furcastyla* Tokunaga and Etsuko. Wings with median fork at level of radial fork, base of M$_2$ angulated and with a very short backward spurlike prolongation, R$_1$ ending slightly before tip of M$_3$. Male hypopygium with cerci longer than ninth tergite and each armed with 9 to 11 retinacula on an apical quarter and three setæ



Pericoma spinicornis sp. nov. (Male)

FIG. 30. Basal and apical segments of antenna; 31, allurement organ; 32, wing; 33, dorsal aspect of sternal parts of hypopygium; 34, ninth tergite and cerci.

beyond middle; style clawlike; ædeagus extending caudad as far as coxites; sheath of ædeagus slightly clavated.

Male.—Body, about 2.3 mm long. Wings, about 2.35 mm by 1.05 mm. Body almost entirely dark brown.

Head with eyes separated above as wide as two facets from each other, eye-bridge double and consisting of a dorsal inverted Y-shaped and a ventral simple bridge; frontal scaly area triangular. Maxillary palpi with four segments in proportion of 27 : 41 : 39 : 50. Antennæ (Fig. 30) 16-segmented, but with first and second flagellar segments partially united; scape about twice as long as wide (50:24) and cylindrical; pedicel a little shorter than wide (20:18) and discoidal; first flagellar segment cylindrical, about 3.5 times as long as wide (27.8), with four strong spines arranged in a line and partially united with second; second a little longer than wide (11.8), short-oval and with two strong spines; following segments short-oval and gradually shortened and distal segments round; ultimate segment with basal node as long as wide and apical process very small and about one-third as long as basal node; relative lengths of distal eight segments about 10 : 9.5 : 9.5 : 9 : 8 : 7.5 : 7 : 10.

Thorax with a pair of large reniform saclike projections above spiracles of mesothorax (Fig. 31). Legs all black, with segments, except for basal two, in relative length of 170 : 200 : 90 : 40 : 27 : 19 : 28 in fore, 180 : 225 : 100 : 48 : 27 : 19 : 27 in middle and 187 : 250 : 40 : 26 : 18 : 27 in hind leg. Wings (Fig. 32) uniformly dark brown on veins and membrane, with a veinlike fold along R_1 in costal cell, R_1 extending beyond level of tip of M_4, R_{2+3} arising before origin of R_5, radial fork above median fork, R_4 and R_5 ending before and beyond wing tip respectively, M_2 basally angulated, with basal section somewhat obscure and backward prolongation short and as long as basal section of M_2, relative lengths of R_1, M_3, M_4 and Cu_1 about 100 : 100 : 90 : 68, those of R_{2+3}, R_2 and R_3 about 38 : 85 : 103 and those of M_{1+2} and M_2 about 45 : 83.

Hypopygium (Figs. 33 and 34) with ninth tergite shorter than basal wide (60:90), round on caudal margin and with a caudal triangular lobe; cerci longer than tergite (90:60), slightly arcuated, scaly, each with nine to eleven retinacula on apical quarter and three rather slender setæ beyond middle on dorsal side; coxites conical, far longer than basal wide (54:40), scaly on dorsal side and with many setæ on mesal side of basal part; styles far longer than coxites (73:54), clawlike, sharply pointed, scaly on basal part and with many minute setæ scattered; ædeagus rather slender, straight, with apodeme very short, total length of ædeagus and apodeme a little longer than styles (82:73); sheath of ædeagus broad basally, narrowed on apical half, but slightly clavated and extending caudad not far beyond tips of coxites; parameres not distinct.

Female.—Not known.

Holotype.—Male; Hokkaido; July 7, 1951 (*S. Kato*).

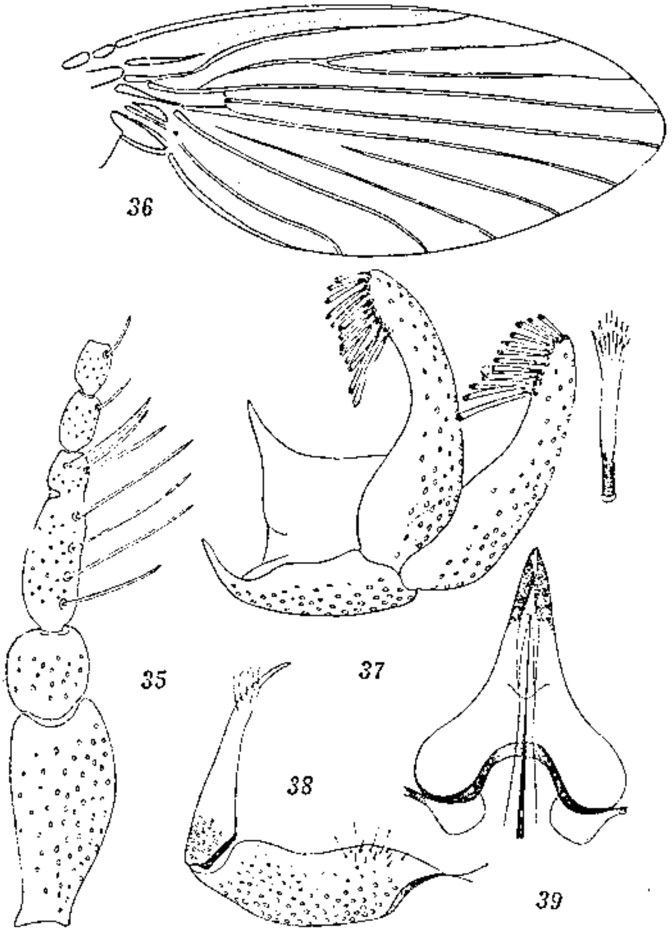
Locality.—Hokkaido, Japan.

This species is somewhat related to *P. furcastyla* Tokunaga et Etsuko and *P. neglecta* Eaton in the structures of the antennæ and wing venation; these two related species, however, the male hypopygia are quite different especially in the structure of cerci of the first related species and in the structure of styles of the second species. *P. canescens* Meigen is another allied species in the structure of the male hypopygium and the wing venation, but the male antennæ of this species are quite simple highly differing from the present species.

PERICOMA CANISQUAMATA sp. nov.

A rather large dark brown species; wings almost entirely dark, without pale apical fringe and with gray scales on basal half of under surface. Antennæ with first flagellar segments long, cylindrical, with four strong spines and fused with second segments which bear three strong spines. Styles of male hypopygium apically excavated very obliquely, very sharply pointed and each with about five delicate setæ arranged in an oblique line on pre-apical part; cerci each with about thirteen apical retinacula. Wing venation: median fork just beyond radial fork and distinctly before tip of Cu_1, R_1 ending beyond tip of M_4, Cu_1 with origin slightly before forking point of M_3 and M_4 but extreme base subatrophied.

Male.—Body length, about 2.41 mm. Wings, about 2.7 mm by 1.2 mm. Vesture of body almost entirely dark; legs entirely black or dark brown but tibiæ and first tarsal segments pale brown; wings with fringe and hairs on veins almost uniformly dark, but squama and veins on basal part with scattered whitish gray erect hairs among rather broad black scales on dorsal surface and gray scales on basal part of ventral surface; fringe almost entirely dark and apical pale fringe absent.



Pericoma canisquamata sp. nov. (Male)

FIG. 35. Basal part of antenna; 36, wing; 37, lateral aspect of ninth tergite and cerci with enlarged retinaculum; 38, coxite and style; 39, ædeagus.

Head with eyes separated above as wide as 1.8 facets from each other, eye-bridge inverted Y-shaped, with stem twice as long as arms, frontal scaly area subtriangular. Maxillary palpi with four segments in proportion of 29 : 40 : 42 : 50. Antennæ (Fig. 35) 16-segmented, but basal two flagellar segments united forming a long cylindrical segment which bears four strong spines on first segment and three similar spines on second flagellar segment; scape about twice as long as wide, pedicel spherical, united flagellar segment about 3.5 times as long as basal width, other flagellar segments oval and about 1.33 times as long as wide, but penultimate two segments subspherical being very slightly longer than wide, ultimate with an apical process shorter than basal node (5:8) and about twice as long as wide; relative lengths of basal and apical six segments about 55 : 20 : 31+12 : 12 : 12 and 11 : 11 : 10.5 : 9 : 8 : 13, respectively.

Thorax with allurement organs broad, flat, subrhombic and black. Legs with segments, except for basal two, in proportional length of 40 : 46 : 23 : 8 : 6.5 : 5 : 6 in fore, 44 : 56 : 25 : 9 : 6.5 : 5 : 6 in middle and 46 : 65 : 28 : 8.5 : 6 : 4.5 : 6 in hind leg. Wings (Fig. 36) with tip round between tips of R_4 and R_5, membrane brownish, veins more brown; venation: R_1 ending beyond tip of M_4, R_{2+3} arising distinctly before origin of R_5 and about half as long as R_2 (38:79), median fork slightly before tip of Cu_1 and just beyond radial fork, Cu_1 arising before origin of M_3, bases of M_2, M_3 and Cu_1 subatrophied and obscure.

Hypopygium (Figs. 37, 38, and 39) with cerci far longer than ninth tergite (10.2:55), arcuated and with about thirteen retinacula at each tip; coxites rather slender, slightly swollen mesad at base and scaly entirely; styles a little longer than coxites (76:70), very slender, clawlike, scaly at base, apical part excavated obliquely, very sharply pointed and with about five delicate hairs on pre-apical part; ædeagus rather slender, a little longer than coxites (80:70), straight, not extending caudad beyond coxites and with sheath of ædeagus subtriangular and a little longer than basal width (60:52).

Female.—Not known.

Holotype.—Male; Mt. Tsurugi, Tokushima Prefecture, Shikoku; June 1, 1950 (*S. Ito*).

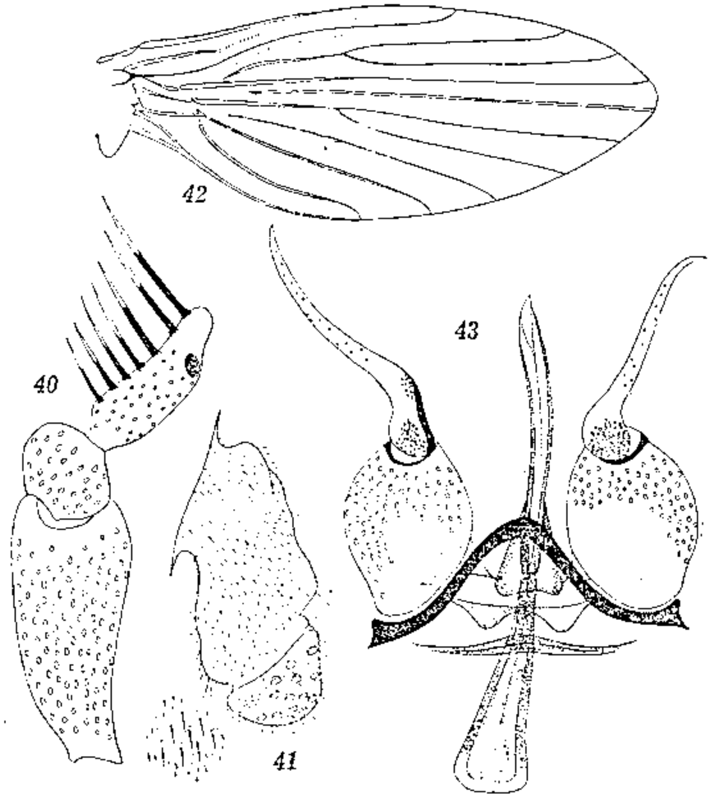
Locality.—Shikoku, Japan.

This is very closely allied to *P. exquisita* Tonnoir in the wing venation and the structure of the male hypopygium. In the allied species, however, the wings are provided with more distinct whitish marking at tips of main veins, the male antennæ are normal without basal fused flagellar segments and strong spines, all tibiæ are apically dark and the cerci of the male hypopygium bear only four apical retinacula, distinctly differing from the present species.

PERICOMA YANOI Tokunaga et Etsuko.

P. yanoi TOKUNAGA ET ETSUKO, Philip. Jour. Sci. 83 (1954) 403–404.

This is a large black species, with wings entirely dark and legs mainly dark, but distal tips of tibiæ and two basal tarsal segments are very narrowly pale. In the present paper the original description is supplemented with more detailed studies on additional materials.



Pericoma yanoi **sp. nov. (Male)**

FIG. 40. Basal part of antenna; 41, allurement organ; 42, wing; 43, dorsal aspect of sternal parts of hypopygium.

Male.—Antennæ (Fig. 40) with scaps cylindrical and about twice as long as wide (65:30), pedicels subspherical and longer than wide (22:15), first flagellar segment unusually long, about thrice as long as wide (41:14), distinctly produced beyond insertion of second segment and with seven strong spines arranged in a line through out the entire length;

following segments missing, but presumably oval and small as in usual cases. Thorax with a pair of tubular protuberances (allurement organ, Fig. 41) which are stout, about twice as long as wide and each provided with a hemispherical chitinized cap. Wings (Fig. 42) with R_1 ending distinctly beyond tip of M_4, radial and median forks at same level and slightly or distinctly before tip of Cu_1, R_{2+3} arising before origin of R_5, R_{4+5} subequal to M_{3+4}. Hypopygium (Fig. 43) with ninth tergite subsquare, far wider than long (35:21) and provided with a rather large triangular caudal lobe; cerci a little longer than width of tergite (39:37), strongly angulated and with about thirteen long retinacula on pre-apical part; coxites oval, longer than wide (23:16) and scaly on lateral and apical parts; styles far longer than coxites (32:23), very slender, slightly arcuated, sharply pointed and scaly on slightly swollen bases; ædeagus very slender, long, pointed apically and extending far beyond coxites, its apodeme narrow on caudal part and broadened on cephalic part, total length of ædeagus and its basal apodeme fully as long as total length of coxite and style (58:55); parameres and sheath of ædeagus not distinct. Other structures as in original description.

Female.—Wings darker and narrower than in male. Subgenital plate shorter than basal width (59:70), with basal part broad, transverse and scaly; caudal part shorter than basal part (25:34), wider than long (35:25), slightly constricted at basis and with caudal lobes very short, round on apical margin and widely separated by a shallow lunular caudal incision from each other; a broad semicircular thin chitinized plate, which bears a pair of small round spots at basal corners, present on middle part of dorsal side of subgenital plate.

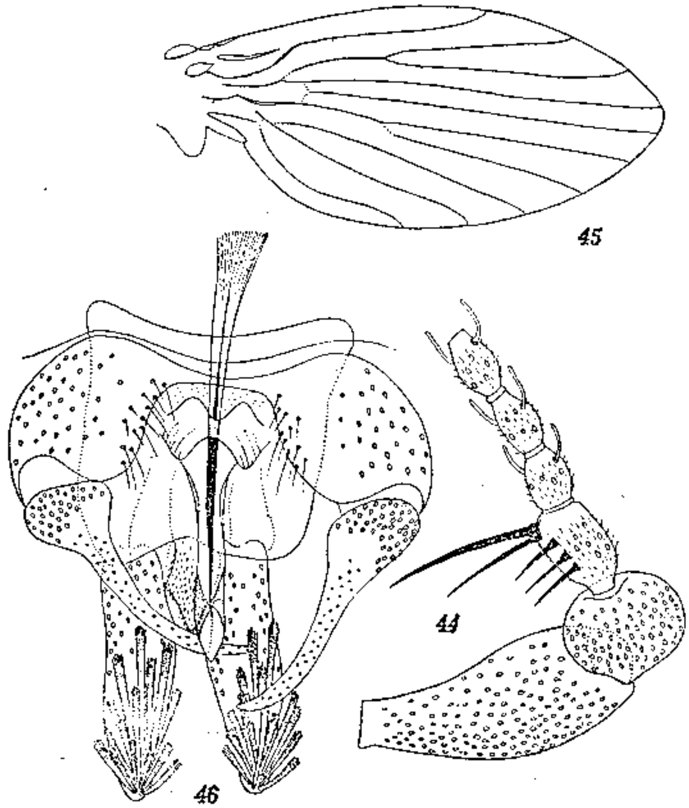
Specimens.—Two males; Matsuyama, Ehime Prefecture; April 2, 1949 (*T. Yano*). A female; Matsuyama, Ehime Prefecture; October 31, 1951 (*M. Tokunaga*).

Distribution.—Shikoku, Japan.

This species is not known from other places in Japan than Shikoku.

PERICOMA ITOI sp. nov.

A rather large dark species, with all tarsi whitish gray, tibial ends of fore and middle legs narrowly whitish gray, wings with apical fringe white. Antennæ 16-segmented; first flagellar segment of male as long as pedicel and with five strong spines arranged in a line. Male hypopygium with cerci as long as ninth tergite and with 17 to 19 apical retinacula; styles very slender, arcuated, scaly and swollen basally; ædeagus very slender and a little shorter than styles.

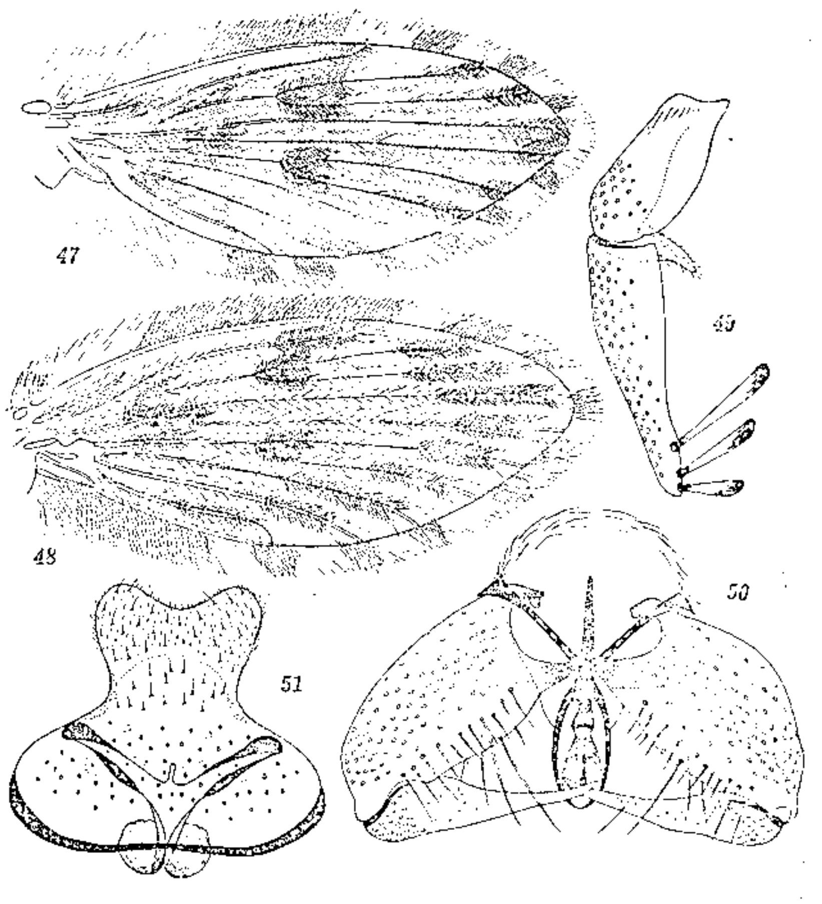


Pericoma itoi sp. nov. (Male)

FIG. 44. Basal part of antenna; 45, wing; 46, dorsal aspect of hypopygium.

Male.—Body, about 3.3 mm long. Wings, about 3.18 mm by 1.36 mm. Vesture of body mainly dark, but legs with all tarsal segments and distal ends of fore and middle tibiæ whitish gray and wings with apical fringe also whitish gray.

Head with eyes separated above as wide as one and half facets from each other, eye-bridge inverted V-shaped and frontal scaly area subtriangular. Maxillary palpi four segments in proportion of 44 : 84 : 75 : 83. Antennæ (Fig. 44) 16-segmented, with scapes clavated and scaly, pedicel somewhat discoidal and scaly, flagellar segments mainly short-oval and about 1.5 times as long as wide, but first segment larger and with three strong and two very strong spines arranged in a line, ultimate segment fully twice as long as wide and with apical process stout and about half as long as basal bulb; relative lengths of basal five and apical eight segments about



***Pericoma shikokuensis* sp. nov.**

Fig. 47. Male wing; 48, female wing; 49, lateral aspect of ninth tergite and cerci of male hypopygium; 50, dorsal aspect of sternal parts of male hypopygium; 51, female subgenital plate with spermathecæ.

41 : 18 : 17 : 10 : 11.5, and 12 : 12 : 11.5 : 11 : 10 : 9 : 8 : 12, respectively.

Thorax with a pair of dark subrhombic or leaflike allurement organs which are finely spinulous and wrinkly. Legs with segments, excepting coxæ and trochanters, in proportion of 44 : 53 : 25 : 8 : 6 : 4.5 : 6 in fore, 50 : 64 : 29 : 10 : 6 : 5 : 6 in middle and 50 : 75 : 30 : 10 : 7 : 5 : 6 in hind leg. Wings (Fig. 45) with R_1 ending at level of tip of M_4, R_{2+3} arising before origin of R_5 and about 0.6 as long as R_2 (52:88), R_{4+5} about a quarter of R_{2+3} (12:52), R_4 and R_5 ending just before and beyond round wing tip, respectively, median fork slightly before tip of Cu_1 and just beyond radial fork, base of M_2 somewhat obscure, Cu_1 arising before origin of M_3, but bases of M_3 and Cu_1 subatrophied.

Hypopygium (Fig. 46) with ninth tergite subrectangular and with caudal lobe subtriangular; cerci as long as tergite (70:70), almost straight and curved dorsad only at apices and with 17 to 19 apical retinacula; coxites a little longer than wide (50:42) and widely divergent caudad; styles as long as cerci and longer than coxite, basally swollen and scaly, very slender, curved, sharply pointed and with many scattered minute punctures; ædeagus slender, a little shorter than styles (65:70), rather pointed at tip, extending caudad straight far beyond coxites, with basal apodeme slender, slightly broadened cephalad and shorter than ædeagus (65:57); parameres not distinct.

Female.—Not known.

Holotype.—Male; Sikanoyu, Gumma Prefecture; June 20, 1951 (*S. Ito*).

Paratypes.—Two males with holotype.

Locality.—Honsyu, Japan.

This species is very closely allied to *P. yanoi* Tokunaga et Etsuko in the wing marking, venation, structures of male hypopygium and antennæ. However, in the allied species, the first flagellar segment of male antenna is far longer than the pedicel, produced beyond insertion of the second segment and with seven strong spines, the allurement organ is tubular and bears a caplike structure at tip, the cerci of male hypopygium is provided with about 15 long retinacula before apex, all distinctly differing from the present species.

PERICOMA SHIKOKUENSIS Tokunaga et Etsuko.

P. shikokuensis TOKUNAGA et ETSUKO, Philip. Jour. Sci. 83 (1954) 401–403.

This is a supplementary report from the original description on the more perfect specimens than the types mainly related to the characters of the wing marking and the genital organs of both sexes.

Male.—Body, about 1.8 to 1.95 mm long. Wings, about 2.07 mm by 0.79 mm. Vesture of body mainly dark brown to brown; wings with mottled appearance being provided with dark and white tufts of hairs on veins and marginal part, wing base with brown hairs mingling with white erect hairs before level of origin of R_5, tufts on veins mainly dark brown, but white tufts present before level of two forks forming a white broad band and beyond middle of the wing on veins R_2, R_3, R_4, M_1, M_2 and M_3, black tufts of hairs present on ends of main longitudinal veins and on radial and median forks, wing margin with white and dark tufts of fringe alternatively arranged white fringes being at tips of veins, wing tip and basal part, fringe of cell Cu_1 consisting of dark and white hairs mingled with each other showing gray appearance. Color of other parts as in original description.

Head with eye-bridge inverted V-shaped; four segments of maxillary palpi in proportion of 22.5 : 36 : 41 : 48.5 and relative lengths of basal five antennal segments about 17 : 18 : 15 : 13 : 13. Legs with femora, tibiæ and tarsi in proportional length of 183 : 163 : 80 : 33 : 24 : 20 : 20 in fore, 152 : 118 : 95 : 35 : 23 : 18 : 20 in middle and 150 : 223 : 95 : 37 : 25 : 18 : 20 in hind leg. Wings (Fig. 47) with R_1 ending slightly beyond tip of M_4, radial fork just beyond or above median fork at level of tip of Cu_1, bases of R_{2+3}, M_2 and Cu_1 somewhat obscure, but Cu_1 arising from forking point between M_3 and M_4, relative lengths of R_1, M_4 and Cu_1 about 83 : 88 : 58, those of R_{2+3}, R_2 and R_3 about 37 : 67 : 80 and those of M_{1+2} and M_2 about 45 : 67. Hypopygium (Figs. 49 and 50) with cerci far longer than ninth tergite (75:50) and with three retinacula which are somewhat shorter than type; coxites subcylindrical, far longer than wide (65:37) and with about four long setæ at middle; styles as long as coxites (63:65), rather broad and scaly on basal part, very slender, sharply pointed on apical half; ædeagus rather short-oval, with basal apodeme slender and total length of ædeagus and apodeme taken together slightly shorter than coxites (60:65) and not projected caudad beyond coxites; sheath of ædeagus short and ending at middle of ædeagus. Other characters as in original description.

Female.—Wings, about 2.12 to 2.39 mm by 0.8 to 1.0 mm. General coloration as in original description; wing marking somewhat different from that of male, main veins with dark brown decumbent and white erect hairs mingled with each other, but black tufts of hairs present on veins of basal cell, at radial and median forks and apical parts of ten main veins excepting extreme tips, white distinct tufts of hairs present at middle of veins R_2, R_3 and M_1 and extreme tips of R_1, R_2, R_3, M_1, M_2, M_3, M_4 and Cu_1; wing margin with dark and white fringes alternatively arranged as in male, but costal basal white fringe narrower than in male and anal fringe of cell Cu_1 consisting of only dark brown hairs. Legs mainly dark brown or dark, but with distinct whitish gray bands on parts of joints between tibiæ and first tarsal segments, first and second and second and third tarsal segments.

Head with eye-bridge simple and slender. Antennæ with basal four segments in proportion of 25 : 20 : 18 : 15. Wings (Fig. 48) with radial and median fork on the same level slightly before tip of Cu_1 relative lengths of R_{2+3}, R_2 and R_3, about 46 : 79 : 97 and those of M_{1+2}, M_1 and M_2 75 : 94 : 80. Subgenital plate (Fig. 51) shorter than basal width (71.7: 85.5), with basal part oval, about twice as wide as long (85.5: 42.7) and scaly; caudal part broadened caudad, about 1.5 times as wide as long (44:29) at caudal end, setigerous and with caudal lobes very short and round at apices; dorsal inner plate with two small pores at basal part; spermathecæ small, round, contiguous with each other and quite bare on surface; ovipositor longer than subgenital plate (96:71.7) and normal.

Specimens.—A female; Mt. Hiko, Fukuoka Prefecture, Kyushu; June 29, 1945 (*S. Ito*). A male; Samachi-Mura, Tokushima Prefecture, Shikoku; May 10, 1951 (*T. Shiraki*). A male; Kibune, Kyoto, Honsyu; May 2, 1955 (*M. Sasakawa*).

Distribution.—Honsyu, Shikoku and Kyushu, Japan.

This species is very closely allied to *P. trifasciata* Meigen as stated in the original description, but in the allied species the wing is provided with vein Cu_1 distinctly connected with M_{3+4} just before the fork between M_3 and M_4, the style of the male hypopygium is distinctly swollen on the basal part, suddenly narrowed on the apical half and curved about angle 90 degrees, the basal part of the female subgenital plate is somewhat trapezoid and the lateral margins are undulated and the spermathecæ are oval, distinctly differing from the present Japanese species.

PERICOMA RETICULATIPENNIS Tokunaga et Etsuko.

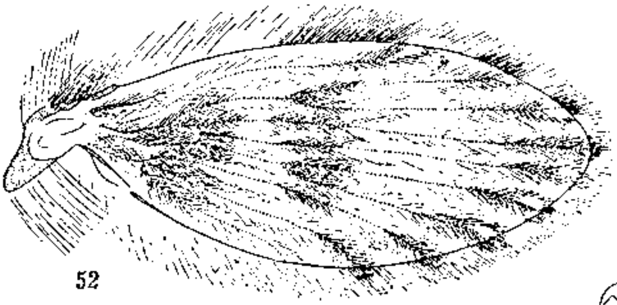
P. reticulatipennis TOKUNAGA et ETSUKO, Philip. Jour. Sci. 84 (1955) 221–223.

This is very closely allied to *P. trifasciata* Meigen in the coloration of the wing vesture, the wing venation and the male hypopygium. In the present report, the wing marking is shown with a figure for the sake of comparison of this species with the allied species and the original description of the male hypopygium is supplemented with the re-observation on the holotype.

Wings (Fig. 52) with many white and dark fringes alternatively arranged, dark tufts of hairs on veins forming a distinct band at middle of wing between tips of R_1 and Cu_1, white tufts of hairs on veins forming two broad bands one being before and one being beyond the middle dark band, dark tufts of hairs around basal wing cell and on bases of M_3, M_4 and Cu_1 forming a rather large dark basal spot, dark tufts on apical parts of veins from R_2 to M_3 forming a broad band along margin of distal half of the wing. Male hypopygium with ninth tergite subsquare (60×60), cerci far longer than the tergite (88:60), coxites shorter than cerci (80:88), styles longer than coxites (90:80), ædeagus (Fig. 53) rather short, stout, ending before middle of coxites, with basal apodeme slender and a little longer than ædeagus (44:40), sheath of ædeagus subtriangular, parameres not developed; other structures of the male hypopygium as in original description.

PERICOMA SUBNUBILIS sp. nov.

A large gray species; male paler being generally whitish gray, wings brownish gray and with many dark tufts of hairs, several white tufts, dark and brown fringes alternatively arranged and yellowish white apical fringe; female darker, wings distinctly darker, with only three distinct white tufts of hairs on veins and apical fringe brownish gray; legs mainly dark, but tibiæ brownish and first tarsal segments largely white. Antennæ normal; eyes rather widely separated above from each other. Wings with vein R_{2+3} arising distinctly beyond level of origin of M_3 and before origin of R_5, Cu_1 with base



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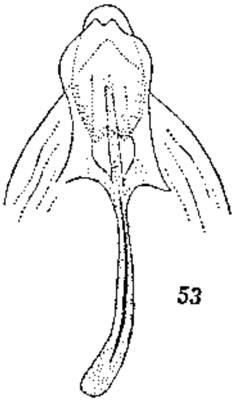

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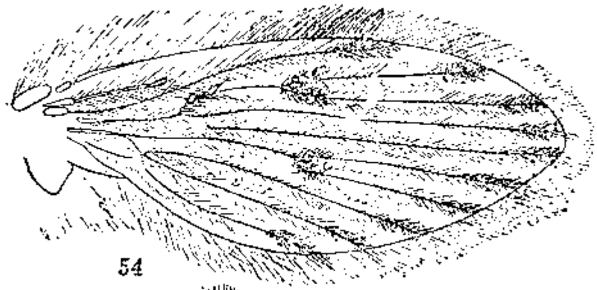

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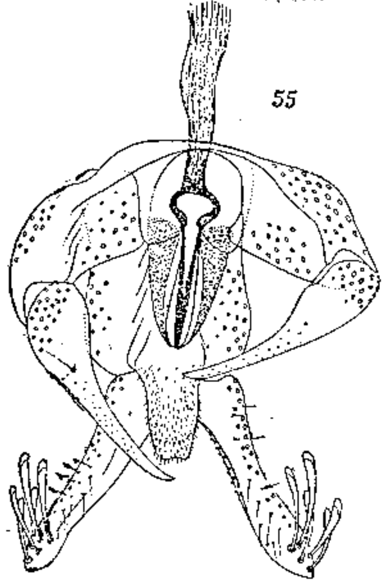

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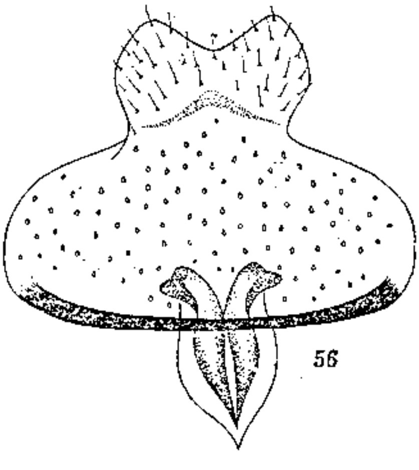

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Pericoma reticulatipennis **Tokunaga et Etsuko**

FIG. 52. Female wing; 53, ædeagus.

Pericoma subnubilis **sp. nov. (Male)**

FIG. 54. Male wing; 55, dorsal aspect of male hypopygium; 56, female subgenital plate with spermathecæ.

somewhat obscure but arising from forking point between M_3 and M_4, R_1 ending far beyond tip of M_4. Male hypopygium with cerci longer than ninth tergite and bearing five apical retinacula, styles slightly swollen and setigerous basally, as long as coxites, slender, clawlike and sharply pointed, ædeagus and its sheath extending caudad as long as coxites. Female subgenital plate far shorter than basal width, with basal part oval, caudal part constricted at base and two lobes broad and short; spermathecæ united forming a cordiform body and quite smooth on surface.

Male.—Body, about 3.1 mm long. Wings, about 3.2 mm by 1.2 mm. Vestures of head and abdomen gray; thoracic vesture of hairs dark on apical half and whitish gray on basal half; legs with dark vesture, but tibiæ mainly pale brown and apically dark, first tarsal segments and extreme bases of second tarsal segments of all legs white and other tarsal segments all dark; wings mainly with brown hairs, dark tufts of hairs at ends of ten longitudinal veins and at forks of R_{2+3} and M_{1+2} yellowish white tufts at middle of R_2, R_3 and M_1, sub-basal part of M_2, pre-apical parts of M_3 and Cu_1, distal one-third of R_4 and apical part of R_{2+3} a brownish gray band before level of both forks consisting of brown decumbent and white erect hairs, fringe as follows: apical fringe from tip of R_2 to tip of M_1 yellowish white, costal mainly dark brown, but pale brownish gray at end of R_1, black before tip of R_1 and broadly brown on middle part of costal cell, anal mainly brown, but dark at tips of veins from M_1 to Cu_1 and yellowish white at base; squamal fringe pale brown.

Head with eyes separated above as wide as 2.5 facets from each other and eye-bridge inverted V-shaped. Maxillary palpi four-segmented (27:47:49:57). Antennæ 16-segmented, with ascoids all short and trichoid, scape about twice as long as wide, pedicel subspherical and a little longer than wide, flagellar segments all oval, 1.5 or 2 times as long as wide, ultimate segment with apical process obscure; relative lengths of basal five and distal eight segments about 30 : 23 : 18 : 16.5 : 16 and 15 : 15 : 14.5 : 13 : 11 : 12.5 : 9, respectively.

Thorax without allurement organ. Legs with segments from femora to last tarsal segments in proportion of 47.5 : 50 : 23 : 9 : 6.5 : 6 : 7 in fore and 50 : 60 : 27 : 11 : 6.5 : 6 : 7 in middle leg; hind legs missing. Wings (Fig. 54) with tip round between ends of R_4 and R_5, R_{2+3} arising distinctly before origin of R_5 and beyond origin of M_3, R_1 ending beyond tip of M_1, radial fork just before median fork, Cu_1 arising from forking point between M_3 and M_4 but basis subatrophied, basal cell rather long, relative lengths of R_{2+3} and R_2 about 45 : 95.

Hypopygium (Fig. 55) with ninth tergite longer than wide (77.65), subsquare and with caudal lobe longer than wide (32: 22) and truncated apically; cerci a little longer than the tergite (85:77), slightly curved and with five apical retinacula; coxites twice as long as wide (75:35), rather slender and scaly; styles as long as coxites (72:75), basal one-third scaly and somewhat swollen, apical two-thirds very slender, sharply pointed, claw-like and with many punctures; ædeagus shorter than coxites (45:75), almost straight and with basal apodeme fully as long as ædeagus (50:45), sheath of ædeagus conical and enveloping the entire length of ædeagus.

Female.—Body larger than male and about 3.7 mm long. Wings, about 3.68 mm by 1.46 mm. Vesture of body far darker than in male; wings with hairs mainly dark brown, with black tufts of hairs at radial and median fork and ends of all veins, white tufts of hairs at distal part of R_{2+3}, pre-apical part of R_2 and middle part of M_1, apical fringe between ends of R_2 and R_4 pale brownish white, that between ends of R_4 and M_2 brownish gray, costal and anal fringes mainly dark brown, but more brownish on basal parts. Coloration of legs mainly as in male, but bases of first tarsal segments of all legs narrowly dark. Other characters generally as in male with usual sexual differences.

Head with eyes separated above as wide as four facets. Maxillary palpi with four segments in proportion of 33 : 44 : 44 : 50. Antennæ with scapes rather short and a little longer than wide, pedicels spherical, following segments elongated oval and hardly twice as long as wide, but distal flagellar segments short-oval and about 1.5 times as long as wide, ultimate with prominent apical process; relative lengths of basal and distal five segments about 27 : 22 : 18 : 18 : 17 and 13.5 : 13.5 : 10 : 10 : 14, respectively.

Legs missing. Wings with venation as in male, bases of R_{2+3}, R_5, M_2, R_3 and Cu_1 subatrophied, relative lengths of R_{2+3}, and R_2 about 56 : 104. Subgenital plate (Fig. 56) far shorter than basal width (110:78), narrowed at base of common basal part of caudal lobes, with basal part oval, scaly and about half as long as basal width (50:110), caudal part for shorter than wide (29:54), with lateral sides slightly convex, with caudal median incision about a quarter as deep as length of caudal part (7:29) and caudal lobes triangular; spermathecæ united forming a cordiform body and quite bare on surface; ovipositor normal and about 1.5 times as long as subgenital plate (120:78).

Holotype.—Male; Takatsuki, Osaka Prefecture; April 12, 1949 (*S. Ito*).

Allotype.—Female; Kamigamo, Kyoto; April 6, 1943 (*S. Ito*).

Locality.—Honsyu, Japan.

This species is closely allied to *P. nubila* Meigen (=*trivialis* Eaton), which is rather variable in coloration; but the allied species is distinctly different from the present species in the following points: the wings are provided with the bases of Cu_1 and M_2 not subatrophied but complete, the styles of the male hypopygium are gradually tapered and not so attenuate apically as in the present species, the ædeagus is larger extending caudad beyond the tips of the coxites, and the caudal lobes of the female subgenital plate are quite round apically, besides the difference of the coloration of the vesture of the wings.

At present two species and a subspecies which are newly found in Japan are included to six known species of the genus.

Key to the Japanese species of Telmatoscopus

1. Wing with vein R_{2+3} arising from costal margin of basal cell before origin of R_5 or from the same point to the origin of R_5 .... 2.
   Wing with vein R_{2+3} arising from vein R_{2+3+4} beyond origin of R_5 .... 4.
2. Wing vein R_4 ending at round tip of wing. Male flagellar segments with ascoids three- or four-branched and several on each segment, distal flagellar segments with well developed neck-parts and similar in shape to preceding ones; radial fork of wing vein beyond median fork, but before tip of Cu_1; cercus of male hypopygium with three apical retinacula (Female unknown) .... *T. kii* Tokunaga et Etsuko.
   Wing vein R_4 not ending just at tip of wing .... 3.
3. Wing with radial fork beyond median fork and both forks before level of tip of Cu_1. Antennal flagellar segments all with long neck-parts which are longer than basal nodes, ascoids two-branched in male and simple in female; cercus of male hypopygium with retinacula only at tip .... *T. albipunctatus* Willistone.

Wing with radial and median forks at same level of tip of Cu_1. Antennal flagellar segments of male with short neck-parts which are shorter than basal nodes, ascoids of male very broad and leaflike; cercus of male hypopygium with many retinacula on dorsal side of apical half (Female unknown).
T. frondeus Tokunaga et Etsuko.

4. Wing with R_4 ending just at pointed tip of wing .... 5.
Wing with R_4 and R_5 ending before and beyond tip of wing, respectively .... 6.

5. Basal two flagellar segments of both sexes united showing gourd-shaped appearance; wing with radial fork before median fork. In male, antennal ascoids consisting of many filiform threads arranged in two lines, those threads of distal line extending forwards and those of basal line backwards, middle tibia with a strong recurved spine at tip, cercus of hypopygium with two small scale-like retinacula at tip; in female, antennal ascoids two-branched.
T. spinitibialis Tokunaga et Etsuko.
Basal two flagellar segments of male united forming large suboval body; wing with radial and median forks at same level to tip of Cu_1. In male, antennal ascoids palmate, penultimate two antennal segments without neck-parts, cercus of hypopygium with five slender retinacula on apical one-third (Female unknown).
T. nigrescens Tokunaga et Etsuko.

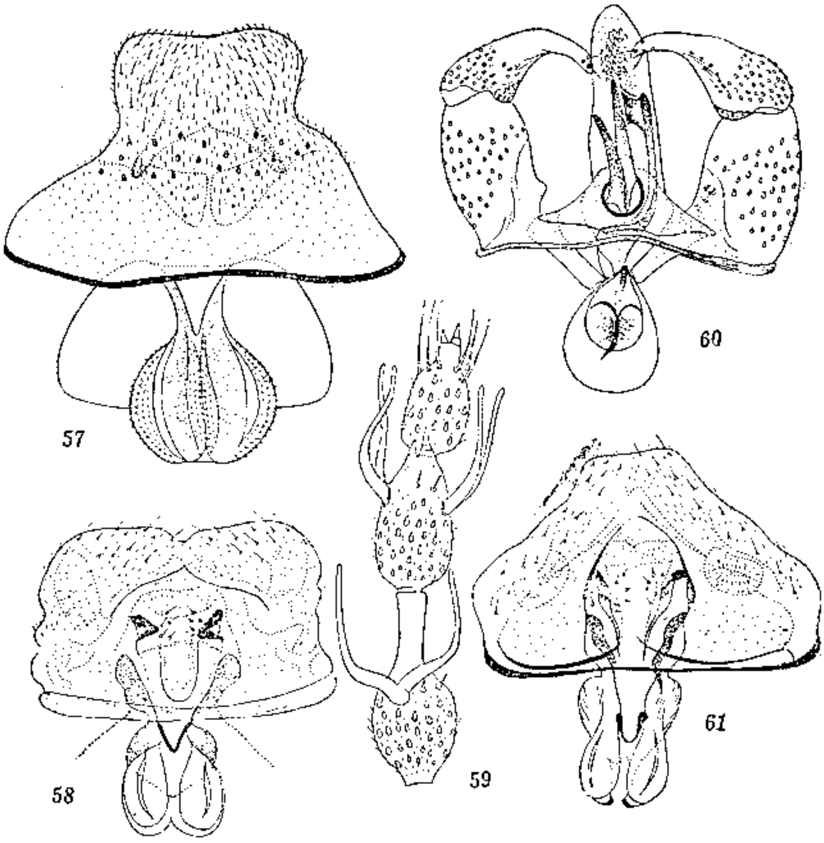
6. Wing with radial fork before median fork. Wing with tip round; in male, antennal ascoids consisting of filiform threads arranged in a line, cercus of hypopygium with many retinacula at tip.
T. itoi sp. nov.
Wing with radial fork beyond median fork .... 7.

7. Wing with tip pointed; in both sexes, antennal ascoids more or less palmate, male basal flagellar segments with port-holelike organs.
T. lanceolatus sp. nov.
Wing with tip round; in male, antennal ascoids broad and collarlike and basal flagellar segments without port-holelike organs (Female unknown) .... *T. saxicolus* Tokunaga et Etsuko.

TELMATOSCOPUS ALBIPUNCTATUS Williston.

T. albipunctatus WILLISTON, Ent. News 55 (1893) 113; DEL ROSARIO, Philip. Jour. Sci. 59 (1936) 129–132; TOKUNAGA, Jap. Jour. Sanit. Zool. 4 (1953) 101–107; TOKUNAGA et ETSUKO, Philip. Jour. Sci. 84 (1955) 213–215.

This is well known, rather cosmopolitan species, often discussed by many authors and recently Tokunaga (1953) reviewed its systematic relation and pathogenic consideration on myiasis. Following names are synonymous to the present species: *T. meridionalis* Eaton (1894), *Psychoda snowii* Haseman (1907), and *P. erecta* Curran (1926). At present the author intends to supplement del Rosario's (1936) and Tokunaga and Komyo's (1955) paper with the result of re-examination on a few points.



Telmatoscopus albipunctatus Williston

FIG. 57. Female subgenital plate with spermathecæ.

Telmatoscopus spinitibialis Tokunaga et Etsuko

FIG. 58. Female subgenital plate with spermathecæ.

Telmatoscopus spinitibialis okinawanus subsp. nov

FIG. 59. Apical part of female antenna; 60, dorsal aspect of sternal parts of male hypopygium; 61, female subgenital plate with spermathecæ.

Female.—Wings with R_{2+3}, R_{4+5} and R_2 in proportion of length of 50 : 15 : 103. Subgenital plate (Fig. 57) far wider than long (110:68), with basal part subtrapezoid and scaly on middle part, apical part setigerous, about half as long as wide, very slightly constricted at base, evenly round at laterocaudal corners, not separated into caudal lobes but only slightly concave on caudal margin; spermathecæ united into a spherical mass which is supported by a pair of longitudinal chitinization and finely sculptured with spinulous dots.

Specimens.—A female and a male; Hachizyo, Kyoto; September, 1955 (*M. Tokunaga*). A female; Naha vicinity, Okinawa, Ryukyu Islands; February 13, 1955 (*P. Arnaud*, by light trap).

Distribution.—Europe, Africa, Philippines, Hawaii, North America, and Japan (Honsyu, Kyusyu, and Ryukyu).

TELMATOSCOPUS FRONDEUS Tokunaga et Etsuko.

T. frondeus TOKUNAGA et ETSUKO, Philip. Jour. Sci. 84 (1955)) 212–213.

The original description is supplemented with the result of the re-examination on the additional materials.

Male.—Head with distinct simple eye-bridge. Ultimate segment of antenna provided with similar leaflike dark ascoids to the preceding flagellar segments. Wings dark on basal half (basal area from level of forks), gray on apical half being provided with mingled pale brown and white hairs on veins, with distinct black tufts of hairs on radial and median forks and at ends of ten longitudinal veins; fringe as follows: an ivory white large tuft at base of costal margin, dark fringe before tip of R_1, yellowish gray or ivory white fringe from tip of R_1 to middle part of anal margin, dark gray fringe on basal half of anal margin. Hypopygium with ninth tergite trapezoid, shorter than basal or apical width (40:70 or 52) and with subtriangular large caudal lobe (25×25); cerci one and half as long as tergite (60:40), rather long, slightly undulated and with great many rather slender spoonlike retinacula on almost entire length of dorsal side except for basal part; coxites short, stout (43×28), strongly swollen laterodorsad and scaly; styles shorter than coxite (36:43), swollen basally, suddenly attenuated and slightly curved, not sharply pointed at tip, with many minute punctures and without distinct scales or setæ; ædeagus round, not distinctly projected caudad beyond coxites, with apodeme large, broad, twice or more as long as ædeagus, without distinct parameres but with a thickened margin along caudal end of sheath of ædeagus. Other structures as in original description.

Female.—Unknown.

Specimen.—A male; Sakawo-gawa, Odawara, Kanagawa Prefecture; April 19, 1942 (*M. Kubota*).

Distribution.—Honsyu, Japan.

TELMATOSCOPUS SPINITIBIALIS Tokunaga et Etsuko.

T. spinitibialis TOKUNAGA et ETSUKO, Philip. Jour. Sci. 84 (1955) 217–220.

This species is very closely allied to North American *T. snowhilli* del Rosario, but it is different from American allied species as pointed out in the original description.

In the present paper the female subgenital plate is redescribed in detail for the comparison with a new subspecies from Okinawa of Ryukyu Islands.

Female.—Subgenital plate (Fig. 58) wider than long, subsquare, caudal margin not far narrower than basal, almost straight, with caudal angles obtuse and a minute median incision: a pair of internal spinulous spots situated on caudolateral parts; spermathecæ oval and smooth on surface.

Distribution.—Honsyu and Hokkaido, Japan.

This is a black species, covered with black vesture of dense scales and the male is provided with a long specific recurved spine at tip of the middle tibia and both sexes are provided with intimately united two basal flagellar segments of antennæ.

TELMATOSCOPUS SPINITIBIALIS OKINAWANUS subsp. nov.

The male is not distinctly different from the type, but the female is notably different in the structures of the subgenital plate and the distal antennal segments.

Male.—Body, about 1.88 (1.69 to 2.15) mm long. Wings, about 2.09 (1.99 to 2.12) mm by 0.85 (0.82 to 0.91) mm. Head with eyes separated above as wide as two facets from each other; maxillary palpi with four segments in proportion of 21.3 : 47 : 56 : 62.7. Antennæ closely as in the type. Hind legs with segments, except for basal two, about 154 : 227 : 85 : 42 : 25 : 23 : 28 in relative length. Wings with R_1 ending above or just before tip of M_4, relative lengths of R_{2+3+4}, R_{2+3}, and M_2 about 32 : 80. Hypopygium (Fig. 60) with following structure as subspecific characters: ninth tergite with a well developed caudal lobe which is far longer than wide (13.5:8); cerci small, shorter than tergite, with basal part semicircular and setigerous, and apical part slightly clavated and with two small apical retinacula which are very finely spinulous; coxites subcylindrical, about twice as long as wide (45.7:23) and slightly shorter than cerci (45.7:48.3); styles as long as cerci, broadened and scaly basally, tapered and curved and with two apical minute setæ; ædeagus large, extending straight caudad, far beyond coxites, with scalelike structure on apical part; apodeme short and oval, combined length of ædeagus and apodeme about 1.38 as long as coxites (66.7:48.3); parameres two, arising from a circular opening, extending closely along ædeagus, shorter one ending at middle and longer one ending at distal one-quarter of ædeagus. Other structures as in original descriptions.

Female.—Body, about 2.47 mm long. Wings, 2.17 to 2.41 mm by 0.83 to 0.99 mm.

Head with eyes broadly separated above as wide as four facets from each other and without eye-bridge. Maxillary palpi with four segments in proportion of 26 : 46 : 55 : 62. Antennæ (Fig. 59) with basal segments as in type, but distal flagellar segments with basal nodes oval, fifteenth segment oval, about twice as long as wide and with a short but distinct neck part and two minute sensory cones on apical part, ultimate segment smaller than penultimate, but similar in shape and with two minute sensory cones on apex and several sensory hairs around base of apical cones but without U- or V-shaped ascoids; relative lengths of distal eight segments about 30.5 : 30 : 29.3 : 28.5 : 26.5 : 25 : 22 : 13.5.

Legs with femora, tibiæ and five tarsal segments in proportion of 150 : 164.5 : 87 : 42 : 27 : 23 : 29 in fore, 181 : 249 : 86.5 : 46.5 : 28 : 23.5 : 29 in middle and 184 : 278 : 98.5 : 43 : 26 : 23 : 29 in hind leg. Wings with R_1 ending far beyond tip of M_4, radial and median forks at same level and far before middle of wing, R_5 ending at tip of wing, relative lengths of R_{2+3+4}, R_{2+3}, R_2, R_5 and M_{1+2} about 15 : 24 : 73.5 : 153 : 41.

Subgenital plate (Fig. 61) far broader than long (96.5 : 34), subtrapezoid, distinctly tapered caudal, truncated apically, caudal margin about one-third as long as basal width (35:96.5) and without median incision; a pair of internal spinulous spots situated near by sub-basal angles of the plate; spermathecæ somewhat elongated, oval and without sculpture on surface; ovipositor about 3.5 as long as subgenital plate (116.5:34).

Holotype.—Female; Naha vicinity, Okinawa, Ryukyu Islands, Japan; February 12, 1955 (*P. Arnaud*, by light trap).

Allotype.—Male at same place to holotype on February 9, 1955, by P. Arnaud.

Paratypes.—Three males and a female with holo- and allotype by light trap.

Locality.—Ryukyu Islands, Japan.

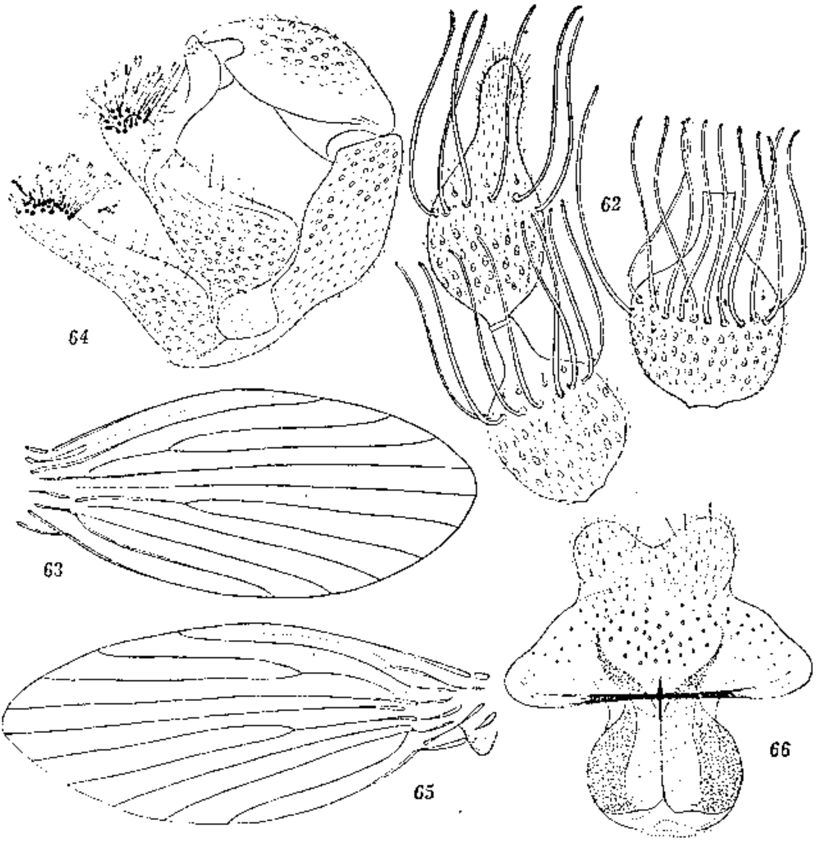
This is very closely allied to the type, but the female distinctly different in the structure of the subgenital plate and somewhat different in the structure of the female distal antennal segments.

TELMATOSCOPUS ITOI sp. nov.

A dark rather large species. Antennæ 16–segmented; flagellar segments, except for ultimate, with short neck parts and large subspherical basal nodes; last segment fusiform and with a rather large apical projection; male ascoids filamentous, surrounding apical part of each flagellar segment, extending far beyond neck part and about 25 on each basal segment and gradually decreasing on apical segment being about 16 on penultimate and about 12 on ultimate segment. Wings with tips round; costal cell with a veinlike stripe along R_1, which ending more or less before level of tip of M_4, radial fork a little before median fork, origin of R_{2+3} slightly beyond origin of R_5, origin of Cu_1 just beyond origin of M_3. Male hypopygium with cerci as long as ninth tergite and with many small forklike retinacula on apical tips; styles undulated, tapered, with several scattered minute sensory setæ, but without scales and other setæ. Female subgenital plate with caudal part far shorter than long, transverse and caudal lobes wider than long and round on margins; spermathecæ forming a spherical body which is very finely reticulated on surface.

Male.—Body, about 2 mm long. Wings, about 1.69 mm by 0.78 mm. Body uniformly dark.

Head with eyes separated above as wide as a facet, eyebridge inverted V-shaped and frontal scaly area subtriangular. Four segments of maxillary palpi about 20 : 41 : 43 : 52 in relative length. Antenna (Fig. 62) with scape cylindrical and twice as long as wide (26:13), pedical subspherical (20×20), first flagellar segment oval (23×14) and with very short neck part, following segments gradually shortened, basal nodes being subspherical, but ultimate segment longer, oval and with rather large apical process; ascoids of flagellar segments all filamentous, surrounding apical parts of basal nodes, about 25 on each basal segment, decreasing number gradually on apical segments being about 16 on penultimate and about 12 on ultimate segment; relative lengths of distal four segments in proportion of 19 : 19 : 18.5 : 22.



***Telmatoscopus itoi* sp. nov.**

FIG. 62. A basal flagellar and two apical segments of male antenna; 63, male wing; 64, lateral aspect of male hypopygium (ædeagus omitted); 65, female wing; 66, female subgenital plate with spermathecæ.

Wings (Fig. 63) with veins and membrane brown, although scales and hairs were rubbed off seeming to have no white tufts or fringe, wing tip round between tips of R_4 and R_5; venation: R_1 ending slightly before tip of M_4, origin of R_{2+3} a little beyond origin of R_5, radial fork far before middle of wing and slightly before median fork, R_{2+3} short and about 0.4 as long as R_2 (24:61), origin of Cu_1 just beyond fork between M_3 and M_4, a veinlike brown stripe extending along R_1 in costal cell.

Hypopygium (Fig. 64) with cerci fully as long as ninth tergite, tapered, scaly and with about 20 short forklike retinacula at each tip; coxites swollen and scaly on lateral sides;

styles tapered, undulated and with several scattered minute sensory setæ but without scales or other longer setæ.

Female.—Body, about 2.73 mm long. Wings, about 2.13 mm by 0.9 mm. Coloration and general structure as in male with usual sexual differences.

Head with eyes separated above from each other as wide as two facets, eye-bridge inverted V-shaped and with a very minute dorsal process. Four segments of maxillary palpi in proportion of 24 : 41 : 45 : 62. Antennæ with scapes cylindrical and about 1.5 times as long as wide (27:18), pedicels spherical (24×23), flagellar segments missing. Wings (Fig. 65) with relative lengths of R_{2+3}, R_2 and R_3 about 32 : 77 : 96, those of M_{1+2}, M_1 and M_2 about 44 : 95 : 84. Legs with femora, tibiæ and five tarsal segments in proportion of 135 : 133 : 66 : 32 : 25 : 21 : 25 in fore, 157 : 204 : 95 : 35 : 27 : 20 : 26 in middle and 160 : 252 : 95 : 37 : 29 : 20 : 27 in hind leg. Subgenital plate (Fig. 66) far wider than long, basal part broad, trapezoid and scaly, caudal part very slightly constricted at base, with caudal lobes semicircular and separated from each other by a shallow caudal incision; spermathecæ forming a large round body which is finely reticulated on surface. Ovipositor about twice as long as subgenital plate (102:50).

Holotype.—Male; Nagamine, Fukuoka Prefecture; August 27, 1946 (*S. Ito*).

Allotype.—Female; Matsuyama, Ehime Prefecture; June 10, 1953 (*T. Yano*).

Localities.—Kyusyu and Shikoku, Japan.

This is closely allied to *T. fraterculus* Eaton and *T. decipiens* Eaton. These two allied species are different in the following points: in *T. fraterculus* Eaton, the flagellar ascoids are arranged in double rings surrounding apical parts of basal nodes and the wings are provided with vein R_1 ending far beyond tip of M_4, the radial fork situated at the level of the tip of Cu_1; in *T. decipiens* Eaton, the flagellar ascoids are similar to those of the first allied species and the wings are provided with the origin of R_{2+3} which is before that of R_5, radial fork is beyond median fork and situated at the level of tip of Cu_1.

TELMATOSCOPUS LANCEOLATUS sp. nov.

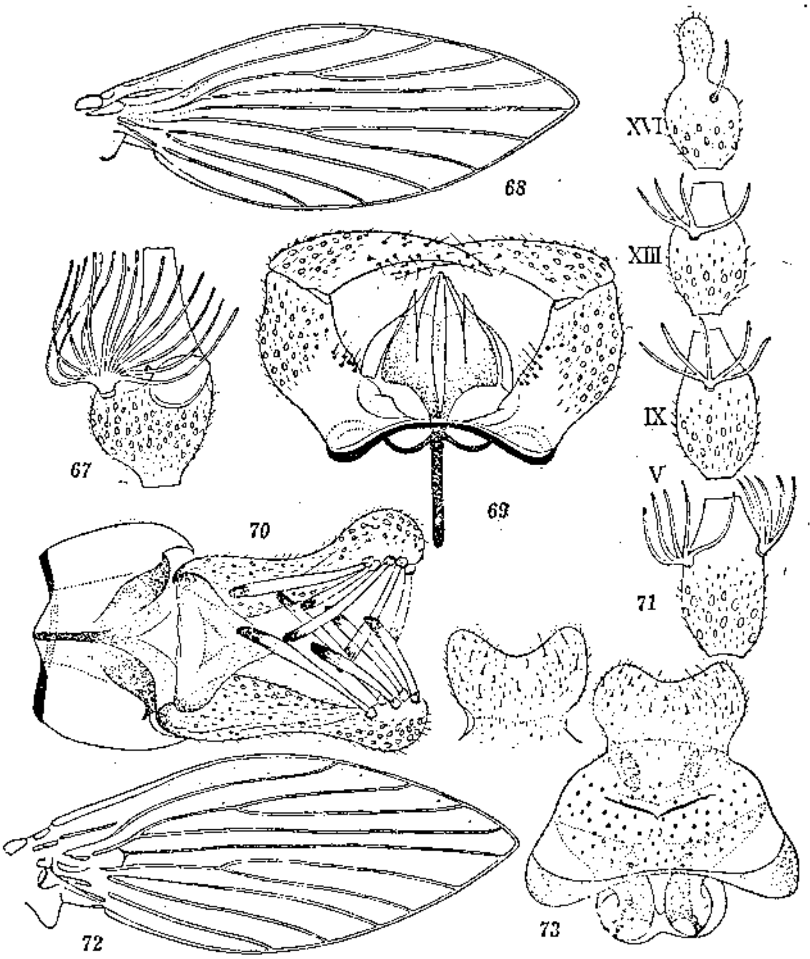
A medium-sized or rather large black or dark gray species. Antennæ sexually different distinctly, male antennæ with porthole organ on basal flagellar segments and ascoids palm-leaflike and female antennæ with neck parts of flagellar segments not well developed, segments being oval and ascoids forked at most into five only. Wings sharply pointed, with origin of R_{2+3} beyond origin of R_5, R_1 ending at level of tip of M_4, radial fork at or just beyond level of median fork, origin of Cu_1 far separated from base of M_4. Male hypopygium with cerci longer than ninth tergite and armed with five large retinacula at apices; styles clawlike, fully as long as coxites and scaly basally; ædeagus triangular and not extending beyond coxites. Female subgenital plate with basal part scaly, apical part slightly constricted at base; spermathecæ rather small and not sculptured on surface.

Male.—Body, about 1.91 mm long. Wings, about 1.72 mm by 0.68 mm. Coloration uniformly dark gray.

Head with eyes contiguous above with each other, without eye-bridge, frontal scaly area transverse and somewhat narrowed at middle. Maxillary palpi with four segments in relative length of 28 : 30 : 35 : 44. Antennæ (Fig. 67) with scapes subcylindrical (27×17), pedical subspherical and slightly shorter than wide (17:20), following two segments (31 and 33) longer than scapes, each with a porthole-like organ and a pair of large palmate ascoids; other flagellar segments missing.

Legs with segments, except for basal two, in proportion of 135 : 166 : 85 : 28 : 21 : 17 : 20 in middle and 120 : 188 : 72 : 30 : 21 : 17 : 22 in hind leg; foreleg missing. Wings (Fig. 68) rather narrow, pointed, with veins rather strong and brown, membrane brown and costal cell fuscous, narrow scales on basal one-third; venation: R_1 ending above tip of M_4, radial and median forks at middle of wing, at same level and slightly beyond tip of Cu_1, R_5 straight, arised before origin of R_{2+3} and ending just beyond wing tip, relative lengths of R_1, M_4 and Cu_1 about 64 : 62 : 45, those of R_{2+3+4}, R_{2+3}, R_2 and R_3 about 12 : 34 : 34 : 52, those of M_{1+2} and M_2 about 45 : 50.

Hypopygium (Figs. 69 and 70) with ninth tergite subsquare, wider than long (47:30) and with a large caudal triangular lobe; cerci longer than tergite (55:30), thickly scaly and with five large retinacula at each tip; coxites rather slender, cylindrical (40×18), scaly on lateral sides and with several minute setæ on mesal sides; styles longer than coxites (50:40), clawlike, sharply pointed, scaly basally, with many minute scattered setæ and punctures; ædeagus triangular, large, not



Telmatoscopus lanceolatus **sp. nov.**

FIG. 67. A basal flagellar segment of male antenna; 68, male wing; 69, dorsal aspect of sternal parts of male hypopygium; 70, ninth tergite and cerci of male hypopygium; 71, flagellar segments of female antenna; 72, female wing; 73, female subgenital plate with spermathecæ and caudal lobes of a different specimen.

extending caudal beyond coxites, with a pair of accessory pointed chitinization, apodeme slender, parameres obscure.

Female.—Body length, about 2.67 mm. Wings, about 2.07 to 2.13 mm by 0.82 to 0.88 mm. Body almost entirely black; general structure as in male excepting following differences: Head with frontal scaly area transverse and constricted at middle into paired oval parts and with four maxillary palpal segments in proportion of 26.5 : 33.5 : 35 : 46. Antennæ (Fig. 71) 16-segmented, with ascoids at most five-branched, usually four-branched, but those on apical two segments simple, scapes elongated-oval (25×19), pedicel short-oval (23×17), basal flagellar segments oval and hardly twice as long as wide (19–18 : 11–10); segments from 8 to 15 with short neck parts which are half as long as oval basal nodes; ultimate segment oval on basal node and with small oval apical projection which is about half as long as basal node (5:9); relative lengths of distal eight segments about 17.5 : 16.5 : 16.5 : 16 : 15 : 14 : 12 : 14. Legs with segments, except for basal two, in proportion of 140 : 147 : 67 : 29 : 22 : 20 : 27 in fore, 155 : 210 : 95 : 35 : 23 : 18 : 26 in middle and 165 : 220 : 97 : 38 : 26 : 21 : 26 in hind leg. Wings (Fig. 72) relatively broader and more brownish than in male, with radial fork just beyond median fork and before middle of wing, relative lengths of R_1, M_4 and Cu_1 about 85 : 82.5 : 61, those of R_{2+3+4}, R_{2+3}, R_2 and R_3 about 7 : 38.5 : 57 : 75, those of M_{1+2} and M_2 about 43 : 72.5. Subgenital plate (Fig. 73) slightly wider than long (78 : 62.5), basal part subtrapezoid, a little shorter than twice of apical part (40:22.5) and scally; apical part somewhat constricted at base, about twice as wide as long (40:22.5), paired caudal lobes very short and widely separated from each other by a caudal wide incision; spermathecæ small, round and without sculpture on surface. Ovipositor about twice as long as subgenital plate (115:62.5).

Holotype.—Male; Mt. Takao, Tokyo; June 17, 1952 (*N. Fukuhara*).

Allotype.—Female; Sibecha, Hokkaido, June 20, 1954 (*M. Sasakawa*).

Paratype.—A female; Ashoro, Hokkaido; June 16, 1954 (*M. Sasakawa*).

Localities.—Honsyu and Hokkaido, Japan.

This species is allied to Japanese *T. nigrescens* Tokunaga et Etsuko, but in the allied species the male flagellar segments are not provided with porthole-like organs and the basal two flagellar segments forming a large swollen mass, the wings are relatively broader and two forks are situated at level of the male hypopygium are not scaly basally and suddenly attenuated beyond middle, highly different from the present species. Another allied species may be *T. palposus* Tonnoir, the male antennæ of this species, however, are provided with port-hole-like organs on flagellar segments from fifth to eighth, differing from the present case.

Genus **BRUNETTIA** Annandale

Hitherto only three species have been known from Japan, of which only *B. lucidisquama* is new to science.

Key to the Japanese species of Brunettia

1. Wing with apical fringe paler, yellowish or whitish and other fringe all dark or brown. In female, flagellar segments fusiform and penultimate shorter than ultimate or preceding one, wing with three white spots at ends of R_1, R_2 and R_3, caudal lobes of subgenital plate far shorter than wide, spermathecæ finely spinulous on surface (Male unknown) .... *B. ishiharai* Tokunaga et Etsuko.
   Wing without apical paler fringe, but all fringe entirely dark or brown .... 2.
2. Antennæ 16-segmented. In male, ultimate antennal segment with basal node elongated and subconstricted, penultimate segment longer than preceding, but shorter than ultimate, wing with broad irradiant scales scattered on upper surface and without distinct white spots along margin (Female unknown) .... *B. lucidisquama* sp. nov.
   Antennæ 15-segmented. In both sexes, ultimate antennal segment with basal node suboval and not constricted, penultimate segment shorter than preceding and longer than ultimate, wing without broad irradiant scales on both sides but with distinct white spots along margin; in female, caudal lobes of subgenital plate subsquare and almost as long as wide, spermathecæ without sculpture on surface .... *B. spinistoma* Tokunaga et Etsuko.

BRUNETTIA ISHIHARAI Tokunaga et Etsuko.

B. ishiharai TOKUNAGA et ETSUKO, Philip. Jour. Sci. 83 (1955) 414–415.

Several female specimens were examined recently and at present the original description is supplemented with the result of the re-examination on these materials.

Female.—Head with eye-bridge inverted V-shaped. Antennæ (Fig. 75) 15-segmented; flagellar segments fusiform, with trichoid simple ascoids and many verticils, first and second flagellar segment about 2.2 times as long as wide, following segments gradually elongated and 2.5 to 3 times as long as wide, penultimate three segments gradually shortened and about 2.6 to 2.2 times as long as wide, ultimate rather long, about 3.3 times as long as wide, and with a small clavated apical projection; relative lengths of basal five and apical eight antennal segments about 40 : 20 : 37 : 31 : 30.5 and 30 :

middle into paired oval parts and with four maxillary palpal segments in proportion of 26.5 : 33.5 : 35 : 46. Antennæ (Fig. 71) 16-segmented, with ascoids at most five-branched, usually four-branched, but those on apical two segments simple, scapes elongated-oval (25×19), pedicel short-oval (23×17), basal flagellar segments oval and hardly twice as long as wide (19–18 : 11–10); segments from 8 to 15 with short neck parts which are half as long as oval basal nodes; ultimate segment oval on basal node and with small oval apical projection which is about half as long as basal node (5:9); relative lengths of distal eight segments about 17.5 : 16.5 : 16.5 : 16 : 15 : 14 : 12 : 14. Legs with segments, except for basal two, in proportion of 140 : 147 : 67 : 29 : 22 : 20 : 27 in fore, 155 : 210 : 95 : 35 : 23 : 18 : 26 in middle and 165 : 220 : 97 : 38 : 26 : 21 : 26 in hind leg. Wings (Fig. 72) relatively broader and more brownish than in male, with radial fork just beyond median fork and before middle of wing, relative lengths of R_1, M_4 and Cu_1 about 85 : 82.5 : 61, those of R_{2+3+4}, R_{2+3}, R_2 and R_3 about 7 : 38.5 : 57 : 75, those of M_{1+2} and M_2 about 43 : 72.5. Subgenital plate (Fig. 73) slightly wider than long (78 : 62.5), basal part subtrapezoid, a little shorter than twice of apical part (40:22.5) and scally; apical part somewhat constricted at base, about twice as wide as long (40:22.5), paired caudal lobes very short and widely separated from each other by a caudal wide incision; spermathecæ small, round and without sculpture on surface. Ovipositor about twice as long as subgenital plate (115:62.5).

Holotype.—Male; Mt. Takao, Tokyo; June 17, 1952 (*N. Fukuhara*).

Allotype.—Female; Sibecha, Hokkaido, June 20, 1954 (*M. Sasakawa*).

Paratype.—A female; Ashoro, Hokkaido; June 16, 1954 (*M. Sasakawa*).

Localities.—Honsyu and Hokkaido, Japan.

This species is allied to Japanese *T. nigrescens* Tokunaga et Etsuko, but in the allied species the male flagellar segments are not provided with porthole-like organs and the basal two flagellar segments forming a large swollen mass, the wings are relatively broader and two forks are situated at level of the male hypopygium are not scaly basally and suddenly attenuated beyond middle, highly different from the present species. Another allied species may be *T. palposus* Tonnoir, the male antennæ of this species, however, are provided with port-hole-like organs on flagellar segments from fifth to eighth, differing from the present case.

Genus **BRUNETTIA** Annandale

Hitherto only three species have been known from Japan, of which only *B. lucidisquama* is new to science.

Key to the Japanese species of Brunettia

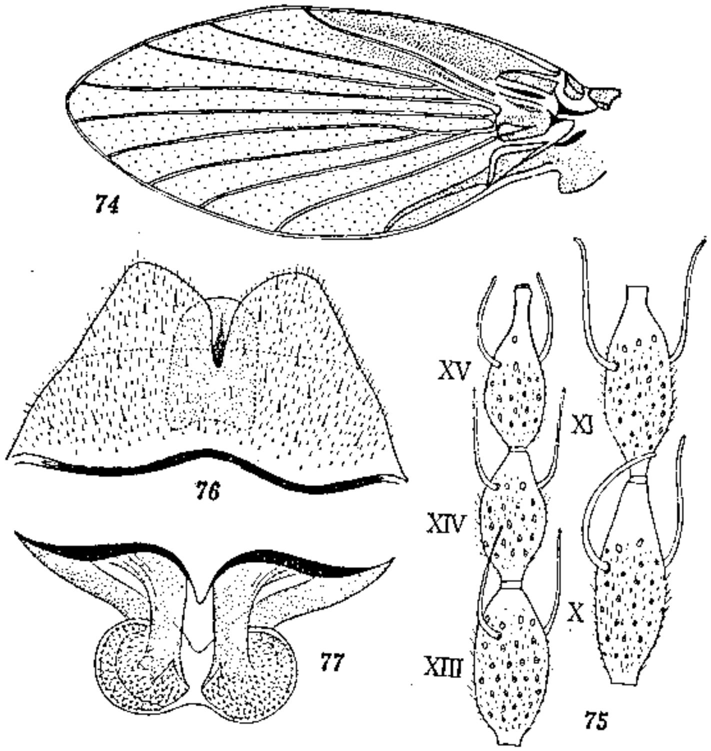
1. Wing with apical fringe paler, yellowish or whitish and other fringe all dark or brown. In female, flagellar segments fusiform and penultimate shorter than ultimate or preceding one, wing with three white spots at ends of R_1, R_2 and R_3, caudal lobes of subgenital plate far shorter than wide, spermathecæ finely spinulous on surface (Male unknown) .... *B. ishiharai* Tokunaga et Etsuko.
   Wing without apical paler fringe, but all fringe entirely dark or brown .... 2.
2. Antennæ 16-segmented. In male, ultimate antennal segment with basal node elongated and subconstricted, penultimate segment longer than preceding, but shorter than ultimate, wing with broad irradiant scales scattered on upper surface and without distinct white spots along margin (Female unknown) .... *B. lucidisquama* sp. nov.
   Antennæ 15-segmented. In both sexes, ultimate antennal segment with basal node suboval and not constricted, penultimate segment shorter than preceding and longer than ultimate, wing without broad irradiant scales on both sides but with distinct white spots along margin; in female, caudal lobes of subgenital plate subsquare and almost as long as wide, spermathecæ without sculpture on surface .... *B. spinistoma* Tokunaga et Etsuko.

BRUNETTIA ISHIHARAI Tokunaga et Etsuko.

B. ishiharai TOKUNAGA et ETSUKO, Philip. Jour. Sci. 83 (1955) 414–415.

Several female specimens were examined recently and at present the original description is supplemented with the result of the re-examination on these materials.

Female.—Head with eye-bridge inverted V-shaped. Antennæ (Fig. 75) 15-segmented; flagellar segments fusiform, with trichoid simple ascoids and many verticils, first and second flagellar segment about 2.2 times as long as wide, following segments gradually elongated and 2.5 to 3 times as long as wide, penultimate three segments gradually shortened and about 2.6 to 2.2 times as long as wide, ultimate rather long, about 3.3 times as long as wide, and with a small clavated apical projection; relative lengths of basal five and apical eight antennal segments about 40 : 20 : 37 : 31 : 30.5 and 30 :



Brunettia ishiharai **Tokunaga et Etsuko**

FIG. 74. Wing; 75, flagellar segments of antenna; 76, subgenital plate, 77, spermathecæ.

29.5 : 28 : 27 : 23 : 22 : 18 : 21.5, respectively. Wings (Fig. 74) usually with six snow white small tufts of scales along wing margin besides yellowish white apical fringe, but sometimes white tufts of scales at tips of R_3, M_3 and Cu_1 reduced and that of at tip of M_3 rarely absent; underside of wing without marginal white spots. Wing venation as in the figure. Subgenital plate (Fig. 76) transverse, far wider than long, its lateral sides convergent caudal, with caudal lobes far shorter than basal width and separated by a narrow V-shaped median incision; spermathecæ (Fig. 77) rather large, subspherical, with spinulous sculpture on surface and each with two chitinized large accessory frameworks. Other characters closely as in original description.

Male.—Unknown.

Specimens.—A female; Kibune, Kyoto; August 8, 1948 (*S. Ito*). A female; Hanase, Kyoto; July 25, 1951 (*S. Ito*). Four females; Takatsuki, Osaka; July 9, 1949 (*S. Ito*). Ten females;

Mt. Hiko, Fukuoka Prefecture, Kyusyu; July 22, 1955 (*T. Esaki*).

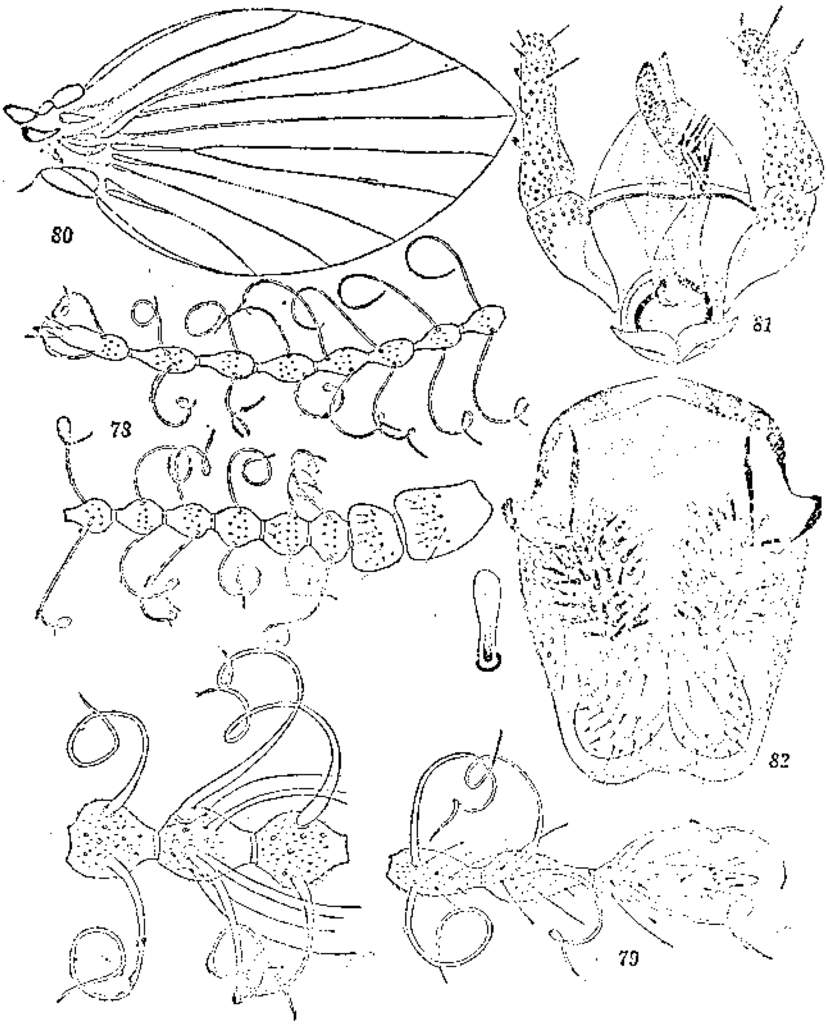
Distribution.—Honsyu, Shikoku (1955) and Kyusyu, Japan.

BRUNETTIA LUCIDISQUAMA sp. nov.

A rather large beautiful dark brown species; wings with brown scales on both sides and scattered irradiant scales on upper surface. Antennæ 16-segmented, with basal flagellar segments subspherical or short-oval, distal segments elongated oval, ultimate longer than thrice the width and with a distinct terminal stylet; ascoids all long, slender and loosely coiled on distal parts. Wings with brown thick scales on both sides and scattered violet irradiant scales on upper surface, vein Rs pectinately branched, stem of radial fork very short, median fork at level of midway of Cu_1 and distinctly beyond radial fork, R_5 ending at tip of wing. Legs generally black, with white rings on tibial tips and tarsal segments. Male hypopygium with ninth tergite far longer than wide; cerci with many small retinacula on apical half; styles fingerlike, scaly and with several scattered small setæ; ædeagus twisted, with about ten strong bristles on middle part; apodeme round.

Male.—Body, about 2.2 mm long. Wings, about 2.12 to 2.27 mm by 1.12 to 1.36 mm. Coloration of vesture as follows: Head brownish white, antennæ pale brown, maxillary palpi brown, thorax white, abdomen black; legs black, with white narrow rings at tips of tibiæ, in fore and middle legs, basal two tarsal segments white on apical half and distal three tarsal segments entirely white, in hind leg, basal two tarsal segments white and with small black spots at bases and distal three tarsal segments all dark; wings mainly brown, with scattered irradiant scales on upper surface and fringe on costal margin dark brown and that of anal margin brownish gray.

Head with eyes separated above as wide as three to four facets from each other, eye-bridge simple, V-shaped or very narrowly interrupted at middle, frontal scaly area oval and somewhat concave on dorsal side. Maxillary palpi with four segments in proportion of 35 : 90 : 68 : 71. Antennæ (Figs. 78 and 79) 16-segmented; relative lengths of basal five segments about 37.5 : 22. 5 : 16 : 20.5 : 21, those of distal eight segments about 20 : 20 : 20.3 : 21 : 22.3 : 24 : 26.3 : 35; ascoids very long, about twice as long as scape (70 to 80 : 35 to 40), filamentous, loosely coiled at distal parts and present



Brunettia lucidisquama **sp. nov. (Male)**

FIG. 78. Antenna; 79, basal and apical flagellar segments of antenna; 80, wing; 81, dorsal aspect of sternal parts of hypopygium; 82, ninth tergite with cerci and enlarged retinaculum.

on all flagellar segments; basal flagellar segments subspherical or short-oval and without or with very short neck parts; following segments gradually elongated, narrowed and with more well developed neck parts; ultimate segment a little shorter that scape (35:37.5), about four times as long as wide, slightly narrowed at middle and with a distinct terminal process.

Legs with femora, tibiæ and five tarsal segments in proportional length of 170 : 165 : 75 : 35 : 25 : 22 : 30 in fore, 190 : 220 : 105 : 47 : 32 : 25 : 32 in middle, and 210 : 275 : 94 : 43 : 29 : 25 : 35 in hind leg. Wings (Fig. 80) broad, with broad scales on upper surface and small scales on under surface; veins with both hairs and scales; venation: R_1 ending slightly before middle of wing, above midway of Cu_1 and distinctly beyond radial fork, R_5 ending at tip of wing.

Hypopygium (Figs. 81 and 82) with ninth tergite far longer than basal widest part (85:70), tapered and with caudal lobe semicircular and small; cerci about 0.6 as long as tergite (50: 85), stout, slightly narrowed on middle part and with many small spoonlike retinacula on apical half; coxites rather slender, about 2.5 times as long as wide and scaly on apical part; styles fingerlike, round at tips, far longer than coxites (50:35), entirely scaly and with several scattered small setæ; ædeagus twisted, curved and with about ten bristles on middle part, ending a little before tip of styles and about 1.3 times as long as styles; apodeme large and round; sheath of ædeagus broad, triangular, pointed caudad and extending caudad as far as ædeagus; parameres practically absent.

Female.—Unknown.

Holotype.—Male; Fukuoka, Kyusyu; September 11, 1946 (*T. Shirozu*).

Paratype.—A male; Ohiso, Kanagawa Prefecture; April 12, 1942 (*H. Hasegawa,* at light).

Localities.—Honsyu and Kyusyu, Japan.

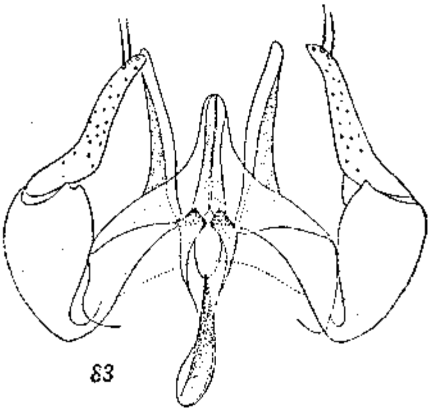
This species is quite specific in the structure of the male antennæ and hypopygium and may be one of the most beautiful species of the Psychodidæ. The wing venation is not modified from the general type of *Brunettia* and the cerci of the male hypopygium are somewhat similar to those of Indian *B. infurcata* Freeman which is one of the highly specialized species being provided with peculiar wings in male.

BRUNETTIA SPINISTOMA Tokunaga et Etsuko.

B. spinistoma TOKUNAGA et ETSUKO, Philip. Jour. Sci. 83 (1955) 411-414.

At present the original description is supplemented with the additional observation on the several materials from various parts of Japan.

Male.—Body, length 1.5 to 1.7 mm. Wings, 2 to 2.15 mm by 1.2 to 1.28 mm. Head with eye-bridge minute and inverted Y-shaped. Wings with R_1 ending at level of tip of Cu_1, relative lengths of R_{2+3+4}, R_{2+3} and R_2 about 6 : 15 : 73, those of M_{1+2}, and R_2 about 6 : 15 : 73, those of M_{1+2} and M_2 about 32 : 94. Hypopygium (Fig. 83): ninth tergite far broader than length and somewhat trapezoid being expanded caudad; cerci shorter than ninth tergite, stout (36×17), entirely scaly, each with a hump beyond middle and a preapical shallow concavity, setigerous with small setæ on apical one-third and with two groups of different racketlike retinacula on apex: one group consisting of seven to ten short retinacula which are shorter than width of cercus (10 to 15 : 17) and another group consisting of fourteen to eighteen long retinacula which are about twice as long as shorter retinacula (10 to 15 : 25 to 29) and suddenly bent at middle; coxites as large as cerci, suboval (36×20) and without scales or setæ, styles longer than coxites (42:36), slender, slightly arcuated, not sharply pointed, with two small apical setæ and many scattered minute punctures, but without scales or other setæ; ædeagus rather slender, almost straight, with slender apodeme and an oval swelling at base of apodeme, the total length of ædeagus and apodeme taken together about twice as long as coxite; parameres symmetrically paired, slender, L-shaped, not sharply pointed, almost straight,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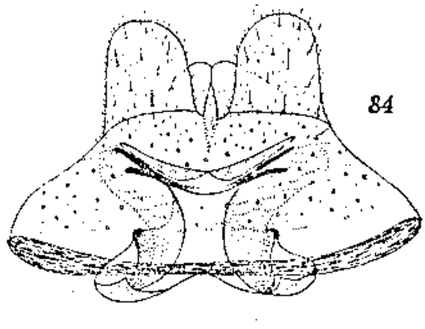
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***Brunettia spinistoma* Tokunaga et Etsuko**

FIG. 83. Dorsal aspect of sternal parts of male hypopygium; 84, female subgenital plate with spermathecæ.

longer than coxite (40:36), extending far beyond ædeagus and with bases extending laterad and far shorter than main part (27:40). Other structures as in original description.

Female.—Head with eye-bridge inverted T-shaped, thickened but stem part minute and pointed. Wings, about 1.8 to 1.93 mm by 0.85 to 0.97 mm, sometimes with another small white marginal spot consisting of white hairs at end of vein M_4, relative lengths of R_{2+3+4}, R_{2+3}, R_2, and R_3 about 5 : 16 : 58 : 78 and those of M_{1+2} and M_2 about 31 : 80. Subgenital plate (Fig. 84) far shorter than basal width (50:83), basal part somewhat oval, caudal part deeply subdivided into two caudal lobes which are longer than wide (18:15), slightly divergent from each other and evenly round at apices; a broad swelling present on dorsal side of the plate. Spermathecæ rather simple, separated from each other and not sculptured on surface. Ovipositor rather long and about twice as long as subgenital plate (90:55). Other structures as in original description.

Specimens.—A male; Kitashirakawa, Kyoto; June 20, 1938 (*M. Tokunaga*). A female; Asiu, Kyoto Prefecture; August 20, 1939 (*M. Tokunaga*). A female; Toziin, Kyoto; May 1, 1940 (*M. Tokunaga*). A male; Takatsuki, Osaka Prefecture; October 21, 1948 (*S. Ito*) and a female at same place; July 12, 1949 by S. Ito. A female; Mt. Atago, Tokyo; October 24, 1949 (*N. Kukuhara*). A female; Nishigahara, Tokyo; May 15, 1951 (*N. Kukuhara*). A male; Naha vicinity, Okinawa, Ryukyu Islands; February, 1955 (*P. Arnaud*, by light trap).

Distribution.—Honsyu, Shikoku and Ryukyu, Japan.

This species is related to *B. novæ-zealandica* Satchell (1950) in the genital structures of both sexes, but in the related species the male wings are not extremely broadened but normal, highly differing from the present species.

REFERENCES

(Supplementing the first part of this series)

FREEMAN, P. Observations on the genus Brunettia Annandale (Dipt., Psychodidæ), with descriptions of two new species. Proc. Ent. Soc. Lond. 20 B (1951) 142–146.

JUNG, H. F. Einige neue mitteleuropäische psychodiden (Diptera). Zool. Anz. 152 (1954) 17–31.

JUNG, H. F. Beiträge zur Biologie, Morphologie und Systematik der europäischen Psychodiden (Diptera). Deutsch. Ent. Zeits. (Neu. Folg.) 3 (1956) 97–257.

SATCHELL, G. H. The New Zealand Psychodidæ. A study based upon the collection and manuscript notes of the late Dr. A. L. Tonnoir. Trans. Ent. Soc. Lond. 101 (1950) 147–178.

SATCHELL, G. H. New species of Fijian Psychodidæ (Diptera). Proc. Roy. Ent. Soc. Lond. 19 B (1950) 176–185.

SATCHELL, G. H. The Australian Psychodidæ (Diptera), Part I. Aust. Jour. Zool. 1 (1953) 357–418.

TOKUNAGA, M., and ETSUKO KOMYO. Japanese Psychodidæ, I. Psychoda species. Philip. Jour. Sci. 83 (1954) 307–316.

TOKUNAGA, M., and ETSUKO KOMYO. Japanese Psychodidæ, II. Nine new species of moth flies. Philip. Jour. Sci. 83 (1955) 401–417.

TOKUNAGA, M., and ETSUKO KOMYO. Japanese Psychodidæ, III. New or little-known moth flies, with descriptions of ten new species. Philip. Jour. Sci. 85 (1955) 205–228.

TOKUNAGA, M. Japanese Psychodidæ, IV. Descriptions and revision of Psychoda species. Philip. Jour. Sci. 86 (1957) 359–403.

TONNOIR, A. L. The Australian Psychodidæ (Diptera), Part II. Aust. Jour. Zool. 1 (1953) 419–448.

SPONGIARES DES ILES PHILIPPINES, PRINCIPALMENT RECOLTEES AU VOISINAGE DE ZAMBOANGA

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VINGT TROIS FIGURES DE TEXTE

En depit de la position geographique particulierement interessante des Iles Philippines, l'etude des Spongiaires des cotes de l'Archipel reste encore actuellement tres insuffisante. Si on excepte les petites notes episodiques de Semper (1868). Carter (1872), Gray (1872) et Higgin (1875), toutes nos connissances reposent sur les diverses monographies du "Chalenger" (Polejaeff, Ridley & Dendy, Sollas, etc.) et de l'Albatros Wilson (1925). Encore, convient-il de preciser que la majeure partie des especes decrites par Wilson ne sont pas strictement littorales. En 1898, Lindgren etudie une petite collection d'eponges recoltees en Mer de Chine a Borneo et a Java, mais dont quelques specimens proviennent egalement des Philippines. Laubenfels (1935) enfin, publie une courte note sur des Spongiaires recoltes a Mindoro.

Mais, si les Eponges des Philippines sont peu connues, on ne peut en dire autant de celles de l'archipel indonesien et des cotes N. de l'Australie, comme en temoignent les diverses publications de Carter, Lendenfeld, Dendy (Australie); Ridley, Hentchel, (I. Aru et Kei) Topsent, Kieschnick et Schulz (Amboine), Thiele (Ternate et Celebes), Bronsted et Lindgren (Mer de Chine) Lebwohl publie d'autre part d'interessantes observations sur les Eponges Japonaises, de meme que Thiele et tout recomment Laubenfels (1954) decrit de nombreuses especes de Iles du Pacifiqueouest.

Le Professeur Domantay, que je remercie tres vivenment a bien voulu me confier l'etude d'une collection d'eponges en provenance des cotes du S. W. de Mindanao (Zamboanga, Basilan, Taganak, Lucap Bay, Coron Bay). Il s'agit d'echantillons recoltes pour la plupart, parmi les Madrepores ou sur les huitres perlieres, soit dans la zonne littorale, soit a quelques brasses de profondeur. C'est ce qui explique qu'on ne retrouve parmi elles presqu'aucune des especes decrites par Wilson. On y trouve, en revanche diverses especes de Ridley et d'autres qui s'apparentent a certaines "grandes especes" indopacifiques.

LISTE DES ESPECES DECRITÈS OU SIGNALEES

TETRACTINOMORPHES

Ecionemia bacillifera (Carter)
Stelleta plagioreducta sp. nov.
Spirastrella inconstans (Dendy)
Stylotella agminata (Ridley)
Homaxinella acanthelloides sp. nov.
Homaxinella domantayi sp. nov.
Phakellia atypica sp. nov.

CERACTINOMORPHES

Acanthodoryx fibrosa gen. nov., sp. nov.
Iotrochota baculifera Ridley
Clathria basilana sp. nov.
Tenacia frondifera (Bow.)
Tenacia ridleyi (Lindgren)
Echinodictyum asperum (Ridley et Dendy)
Toxochalina robusta Ridley
Gellius ridleyi Hentschel
Callyspongia diffusa (Ridley)
Callyspongia subarmigera (Ridley)
Haliclona zamboangæ sp. nov.
Haliclona (*Reniclona*) subcapitata sp. nov.
Adocia sp.
Petrosia similis Ridley et Dendy
Spongia officinalis Linne
Hippospongia fistulosa Lendenfeld
Carterispongia radiata Hyatt
Phyllospongia papyracea (Esper)
Phyllospongia ectoscula sp. nov.
Hircinia dendroides (Polejaef)

ECIONEMIA BACILLIFERA (Carter.) Fig. 1.

E. bacillifera (Carter) BURTON (1937) 7.

Eponge massive, globuleuse, mesurant 5 × 5 × 2.5 cm un peu irreguliere, de couleur brun noiratre et de consistance tres dure. La surface est presque lisse. La charpente squenletti que est caracteristique, rayonnante, mais on distingue dans l'eponge deux couches concentriques: une zone superficielle de 2 mm d'epaisseur ou les spicules sont perpendiculaires a la surface et une zone centrale, assez massive et dense, ou la charpente est beaucoup plus irreguliere.

Spicules.—Oxes: fusiformes: 1950 μ/30–50 μ.

Plagiotriaenes reguliers, dont le rhabde mesure 550 a 1,400 μ 30–50 μ et dont les clades mesurent 70–200 μ de long.

Protriaenes, a rhabde extremement fin: 850 a 1,700 μ/8 μ et clades courts 50–70 μ.

Anatriaenes, a rhabde long: 2,300 μ/20 μ et dont les clades, a brusques courbures, se reunissent a la base en une sorte de plateau distal; les clades mesurent 50 a 150 μ.

Microrhabdes, corticaux, assez courts: 8–11 μ et que paraissent plus ou moins spirales lorsqu'on les observe a fort grossissement.

Tylasters a 5–8 actines, terminees par un bouton: 6 a 9 μ de diametre.

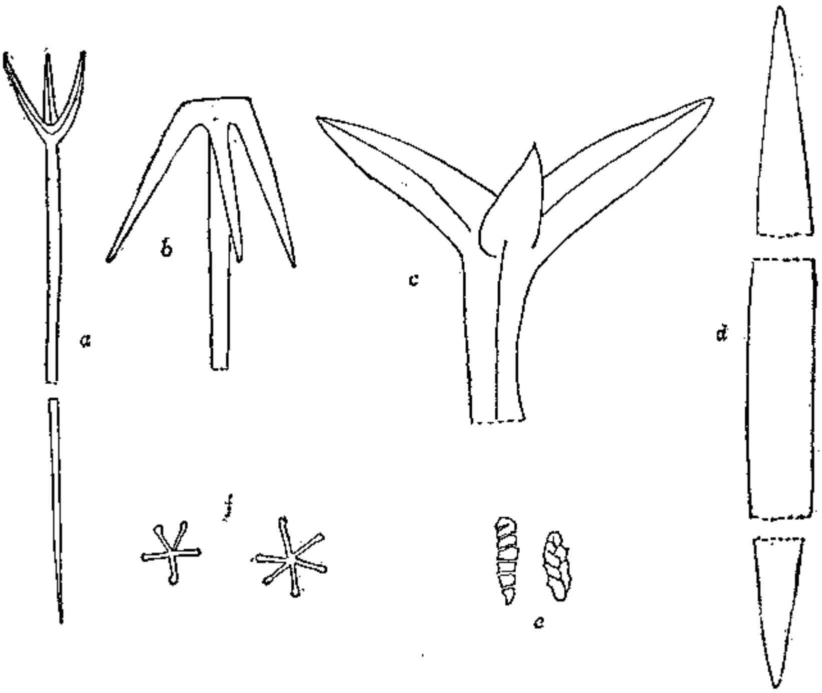


FIG. 1. Spicules d'*Ecionemia bacillifera* (Carter): *a*, protriaene; *b*, anatriaene; *c*, plagiotriaene; *d*, oxe; *e*, tylasters; *f*, microrhabdes.

Remarques.—Burton (1937) a bien note la parente des divers specimens d'Ecionemia, de couleur foncee, recoltes dans les eaux indopacifiques, en insistant sur la fait qu'ils se differencient legerement, par la presence d'oxes dermiques, d'anatriaenes et de protriaenes et par le nombre de categories d'asters. Il reste a demontrer que ces variations sont veritablement intraspecifiques. Il est certain que ce specimen est particulierement voisin de la *Stelleta lobata* Kieschnick, d'Amboine.

Localite.—Pres de Zamboanga; plusieurs brasses, parmi les coraux.

STELLETTA PLAGIOREDUCTA sp. nov. Fig. 2.

Eponge massive, dont le fragment, sectionne transversalement mesure 5 cm de haut, 5 cm de long et 3.5 de large. Sa couleur est brun roux, sa consistance dure et as surface ineguale, ,sans orifices visibles.

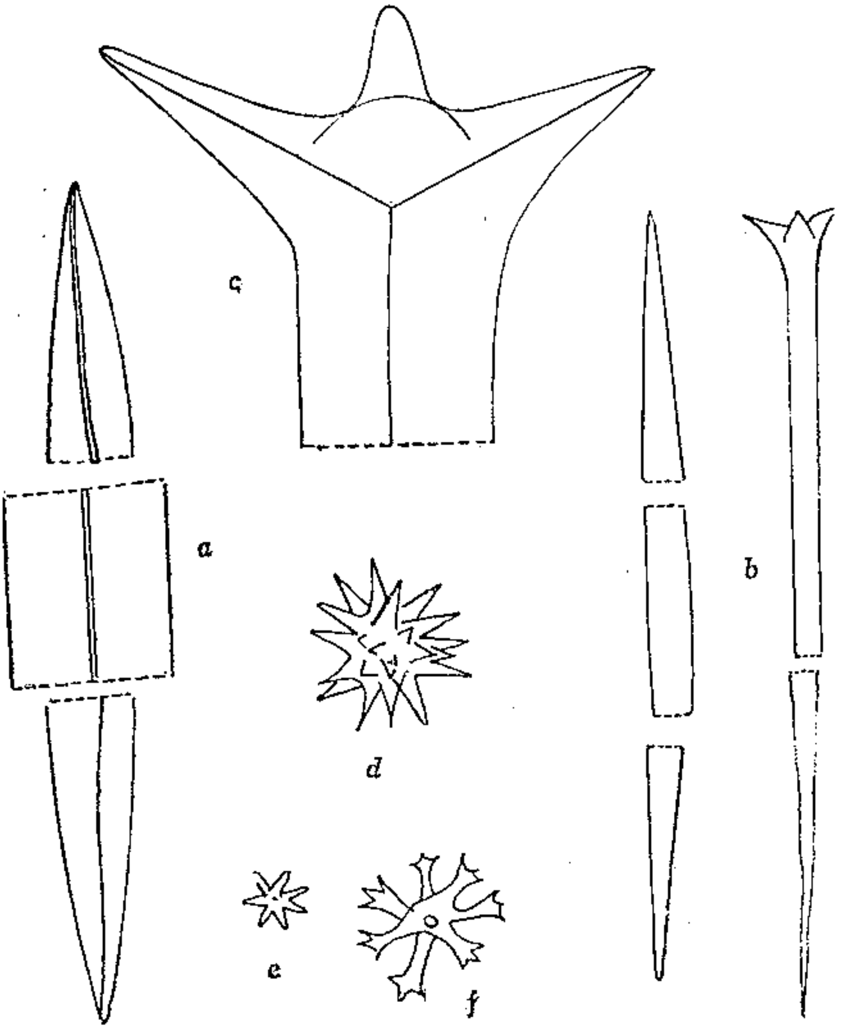


FIG. 2. Spicules de *Stelletta plagioreducta* sp. nov.: *a*, oxe principal; *b*, oxe secondaire; *c*, plagiotriaene; *d*, oxysphaeraster; *e*, strongulaster; *f*, oxyaster.

Le squelette se compose de faisceaux de megascleres entrecroises dans le centre et rayonnant a la peripherie. On observe de nombreuses cavites d'l a 2 mm de diametre, plus specialement, sous une zone corticale, peu differenciee de 3 mm d'epaisseur, qui correspond aux faisceaux superficiels.

Spicules.—Oxes, principaux de tres grande taille: 2 a 2.5 mm sur 100 μ.

Oxes secondaires, plus fins, mesurant 450 a 1,100 μ/10–27 μ.

Plagiotriaenes, a cladone avorte: les clades ne depassent pas, en effet 10 μ de long et sont regulierement effiles. Le rhabde mesure 550–750 μ/ 10 μ.

Oxysphaerasters choanosomiques a tres nombreuses actines: 16–20 μ de diametre.

Oxyasters, plus rares, a pointes trifurquees: 12–13 μ de diametre.

Strongylasters ectosomiques, tres abondants, en forme de roue, 5–6 μ.

Ce bel echantillon s'apparente sans doute aux *Stelleta vestigium* (Dendy) et *Stelleta brevis* (Hentschel.) Il s'en distingue, entre autres, par ses microscleres et par l'ensemble de la spiculation.

Localite.—Pres de Zamboanga, parmi les Madrepores; plusieurs brasses.

SPIRASTRELLA INCONSTANT (Dendy). Fig. 3.

Eponge massive mesurant 5×5×2 cm de couleur brun rouge, composae d'une elevation conique, epaisse et creuse, associee a une plate forme debordante, ressemblant a un chapeau de champignon; plate forme et elevation sont percees, chacune d'un large oscules. Le pied du champignon, de section, triangulaire est un peu renfle. La surface est lisse et percee d'une Quantite de petits pores; la consistance de l'eponge est assez dure.

Le squelette se compose de faisceaux tangentiels et rayonnants de tylostyles.

Spicules.—Tylostyles, a tete globuleuse, plus rarement elliptique de deux tailles: 175–250 μ/7 μ et 300–500 μ/7–15 μ.

Spinispires, rares, tres petites, a pointes cylindroconiquez, courtes et emoussees: 9–14 μ.

Remarques.—La rarete et la forme particuliere des spinispires me semblent devoir caracteriser assez nettlement cettee espece par ailleurs tres voisine de *S. vagabunda* Ridley. Il est probable que le specimen *SE 1075* [Vosmaer (1911) Pl. 12, fig. 12] recolte par le "Siboga" au nord d'Ubian appartient a cette espece.

Localite.—Pres de Zamboanga; fixe sur une huitre perliere: plusieurs brasses.

Distribution.—Indopacifique.

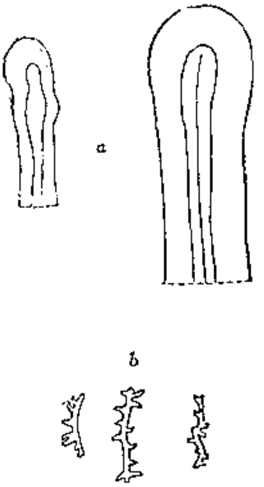


FIG. 3. Spicules de *Spirastrella inconstans* Dendy: *a*, tylostyles; *b*, spinispires.

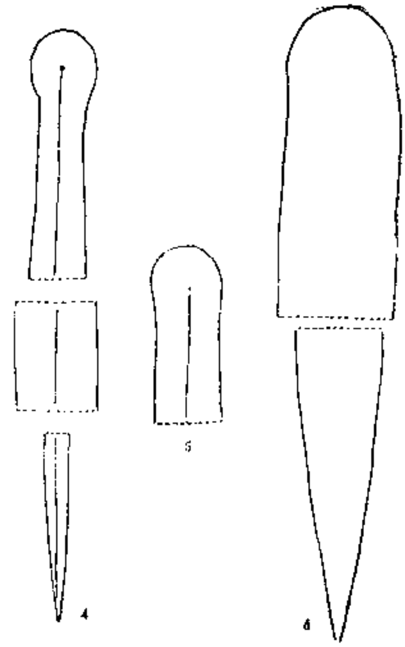


FIG. 4. Spicules de *Stylotella agminata* (Ridley).
5. Spicules d'*Homaxinella acanthelloides* sp. nov.
6. Spicules d'*Homaxinella domantayi* sp. nov.

STYLOTELLA AGMINATA (Ridley). Fig. 4,

S. agminata (Ridley) HALLMANN (1914).

Eponge massive hemicirculaire, composee d'un agglomerat meandriforme d'elements longitudinaux, inegaux, termines vers la surface en lobes charnus, arrondis et prolonges vers le bas par des lames charnus et pigmentees, puis termines par un lacis fibreux longitudinal, tres developpe et incolore. La zone des lobes charnus s'etend sur 1 cm de profondeur; elle est suivie de la zone pigmentee, orange, epaisse de 2 cm; enfin la zone incolore s'etend sur plus de 3 cm.

La surface de l'eponge comprend une croute dermique et des strates tangentielles successives; les faisceaus de tylostyles s'y entrecroisent et certains spicules sont responsables d'une tres faible hispidation.

Spicules.—Tylostyles de toutes les tailles entre 150 et 850 μ /5–17 μ; mais ils se groupent autour de 175, 400 et 800 μ. Leur tete est arrondie et reguliere chez les plus forts et tres souveni biannelee chez les plus petits. Ceux ci sont un peu courbes et les moyens et les grands sont generalement droits ou legerement-flexueux.

Localite.—Dagat-dagatan Pond, Malabon. 1–2 metres; eau saumatre.

Distribution.—Indopacifique.

HOMAXINELLA ACANTHELLOIDES sp. nov. Fig. 5.

Eponge massive, mais caverneuse, de couleur brunrougeatre, dressee, mesurant 9 cm de haut, subdivisee en rameaux en partie concrescents, de 1.5 cm de diametre. Chaque rameau est creux et termine par un oscule de 6 mm, elliptique et beant, sans contour tres precis et dont les parois sont faites de colonettes divergentes de spicules, separees par de vastes cavites. La charpente generale est du type rayonnant, a partir de la cavite centrale es des grandes cavites annexes. Les faisceaux irreguliers de styles forts sont reunis par des spicules transverses epars.

Spicules.—Styles assez trapus, mais relativement courts, de diametre variable et de longueur sensiblement constante: 500–600 sur 10–25 μ. Ils conservent leur diametre sur une grande longueur et sont regulierement courbes.

Localite.—Zamboanga, a basse mer, parmi les coraux.

HOMAXINELLA DOMANTAYI sp. nov. Fig. 6.

Eponge dressee, de couleur rouge, formee de deux rameaux inegaux en lames aplaties, mais dans des pland differents et recourbes l'un vers l'autre dans leur partie distale, apres une zone mediane fortement arquee. L'un d'eux est bifurque pres de son extremite. La surface est assez egale, mais prolongee ca et la par de courtes protuberances coniques. La membrane dermique epaisse et tres craquelee est regulierement traversee par des spicules isoles dressees verticalement ou obliquement, qui donnent a l'ensemble de la surface une certaine hispidation.

Le squelette est compose de spicules tres forts et serres cote a cote, dans le sons longitudinal, qui donnent a l'eponge une consistance tres ferme.

Spicules.—Styles lisses, colossaux, a tete nulle ou tres faiblement renflee, conservant un diametre a peu pres uniforme sur presque toute leur longueur. Ils mesurent 600–750 μ de long et 15–40 μ de diametre.

Localite.—Zamboanga, zone superficielle; parmi les coraux.

PHAKELLIA ATYPICA sp. nov. Fig. 7.

Eponge en eventail, aplati, mesurant 8.5 cm de long et 11 cm de large au sommet; dont une face agglomere du sable en quantite et l'autre reste propre. La surface est egale, lorsqu'elle est observee a faible grossissement, mais elle est en realite tres irreguliere et creusee de nombreux petits crateres plus ou moins osculaires, entoures de cretes meandriformes d'ou s'elevet par places, des pointes herissees de spicules saillants. Les alveoles mesurant 1–2 mm et les crateres 1 mm. La membrane dermique est transparente et soutenue par les pointes et tapisse le fond des alveoles.

Le squellette est assez irregulier et fait de faisceaux de grands styles, plus ou moins anastomoses, ou se trouvent melanges quelques strongyles. De nombreux microxes toxiformes se trouvent repartis dans les membranes autour des faisceaux.

Spicules.—Styles, longs et lisses, forts, un peu recourbes ou flexueux, a courbure variable: 1,200–1,550 μ/16–30 μ.

Strongyles.—Longs et greles, tres flexueux: 1,700 a 2,000 μ.

Petits oxes toxiformes, a centrotylotie variable, dont les extremites sont tres effilees: 200–600 μ/ 4–15 μ.

Remarque.—Le squelette de ce specimen n'est evidemment pas typique du genre *Phakellia* Bow. puisque les styles sont melanges aux strongyles dans les fibres du reseau squelet-tique et n'herissent pas les fibres de strongyles. Par ailleurs, il se rapproche du squellette de *Pararaphyoxya* Burton, dont les strongyles sont memes aux styles et sont accompagnes d'oxes estraaxiaux, dont les extremites s'amanuisent par paliers successifs.

CERACTINOMORPHES

Genus ACANTHODORYX novum

Eponges, dont le squelette se compose de fibres d'acanthostyles radiaires et an astomosees, avec tylotes dermiques et isocheles arques: type: *A. fibrosa* sp. nov.

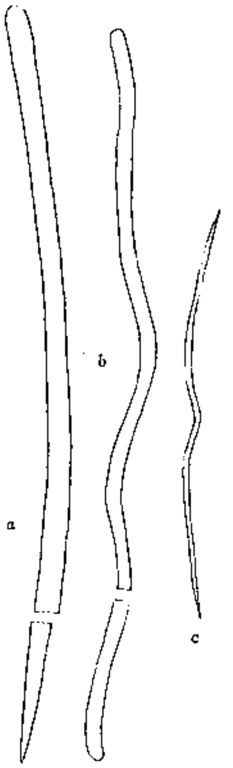


FIG. 7. Spicules de *Phakellia atypica* sp. nov.: *a*, style; *b*, strongyle; *c*, oxe toxiforme.

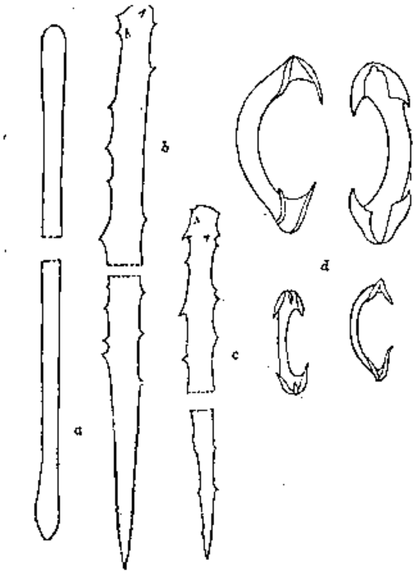


FIG. 8. Spicules d'*Acanthodoryx fibrosa* gen. nov., sp. nov.: *a*, subtylotes; *b*, acanthostyles 1; *c*, acanthostyles 2; *d*, isocheles arques de 2 thailles.

ACANTHODORYX FIBROSA sp. nov. **Fig. 8.**

Eponge massive, blanche, mesurant environ 2.4 cm composee d'une quentite considerable de fibres rayonnantes, divergentes ou paralleles et anastomosees, recouvertes par une fine membrane dermique, bourree d'isocheles arques de 2 sortes et de subtylotes. Les fibres, dont le diametre varie entre 50 et 160 μ sont composees de tres nombreux acanthostyles allonges et greles et de tres peu de spongine.

Spicules.—Tylotes dermiques flexueux ou lineaires, a bouts elliptiques, un peu renfles: 200–240 μ/3–4 μ.

Acanthostyles principaux, sans tete marquee; a l'exception d'un tres leger elargissement; munis d'epines eparses; 150–170 μ/–7 μ.

Isocheles arques, de deux tailles: 20–21 μ et 33–34 μ.

Remarques.—La disposition generale rayonnante du squelette autour de cavites centrales, et l'absence de squelette veritablement reticule et subisodictyal ne permet pas de placer ce specimen dans le genre *Lissodendoryx* Topsent, dont il a, par ailleurs, les memes elements de spiculation: diactines dermiques, monactines chaonosomiques epineux et isocheles arques. Il ne s'agit pas, non plus de Pronax Gray ou de Stylostichon Topsent dont la charpente est plumeuse avec acanthostyles herissants ou divergents. Dans son intelligente classification des Mysillinæ, Hallmann [(1912) 137–146] classe les spicules en 3 categories: basicals (divises en principals et accesories) et auxillaries, spicules dermiques.

Deux especes seulement ont un squelette ou les spicules accessoires remplacent les principaux: ce sont *Paramyxilla infrequens* (Carter) 1881 et *Clathria mollis* Kirkpatrick 1903. Le specimen recolte par Professeur Domantay s'eloigne sensiblement de ces deux especes et ne peut etre ni un *Lissodendoryx*, ni un *Stylostichon*.

Localite.—Zamboanga; plusieurs brasses, sur coquilles perlieres.

IOTROCHOTA BACULIFERA Ridley. Fig. 9.

Un specimen suquadrangulaire, mesurant 10×7×1.5 cm, a structure alveolaire caracteristique.

Spicules.—Styles, a courbure basale: 180–230 μ/11–15 μ.

Strongyles dermiques, peu nombreux.

Birotules rectilignes 17–18 μ.

Localite.—Pres de Zamboanga, littorale; sur substrat rocheux.

Distribution.—Indopacifique.

ICHNODONAX SINGAPORENSIS (Carter). Fig. 10.

Eponge en coussinet, mesurant 2.5×2×1 cm, d'ou s'elevent deux cheminees creuses, grillagees, a mailles polygonales regulieres. Sur le coussinet basal, la membrane dermique subsiste et masque en partie le grillage interne tres puissant, dont les mailles atteignent 1 mm. Les trabecules squelettiques cylindriques sont des faisceaux multispicules d'oxes et de strongyles, qui mesurent environ 250 a 300 μ de diametre.

La membrane dermique, facile a detacher et les membranes internes contiennent, en masse, les memes spicules. On Observe la presence d'un pigment rouge superficiel.

Spicules.—Oxes, lisses, legerement courbes, a pointes breves: 240–275 μ/6–11 μ.

Strongyles courts et courbes 30–100 μ/5–8 μ.

Isocheles palmes.—14–15 μ.

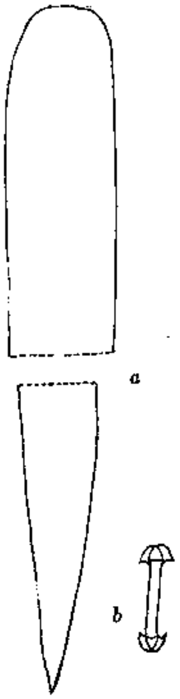


FIG. 9. Spicules de *Iotrochota baculifera* Ridley: *a*, style; *b*, birotule.

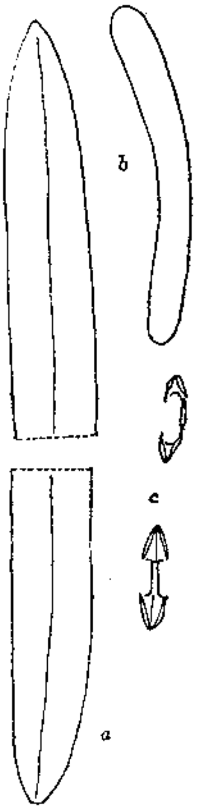


FIG. 10. Spicules d'*Ichnodonax singaporensis* (Carter): *a*, oxe; *b*, strongyle; *c*, Isocheles palmes.

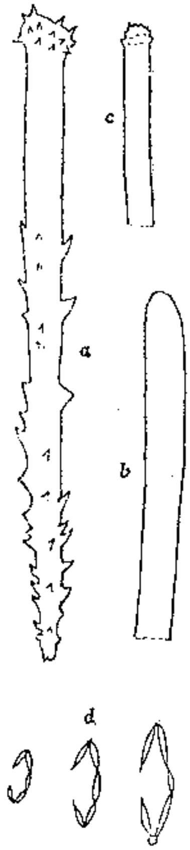


FIG. 11. Spicules de *Clathria basilana* sp. nov.: *a*, Acanthostyles; *b*, style principal; *c*, extremite de tormostrongyles; *d*, Isocheles palmes.

Remarques.—Il me parait hors de doute que l'eponge recoltee par Professeur Domantay correspond a la *Phloeodictyon singaporense* Carter retrouvee et bein redecrite par Lindgren (1898) sous le nom de *Rhizochalina singaporense* (Carter), en provenance cette fois de la Mer de Chine. Divers autres echantillons provienment de divers points de la region indopacifique. En

1954, Laubenfels decrit et figure, sous le nom d'*Ichnodonax kapne* gen. nov., sp. nov. une eponge analogue, formee d'un rhizome d'ou s'elevent par endroits des cheminees de diametre variable. Comme en temoigne le tableau ci dessous, la spiculation de tous ces specimens est presqu identique et je ne crois pas qu'on puisse invoquer la presence de vesicules comme carateres absolu de *I.* (*Histoderma*) *vesiculatum* Dendy (1905), car Dendy, lui meme constate la tres grande analogie de son espece avec le specimen de *R. singaporense* (Carter) examine par Lindgren.

Auteur	Annee	Localite	Fibres	Oxes	Strongyles	Isocheles palmes
Carter	1883	Singapour	----------	300/17	40–80/4	Dendy
Ridley	1884	Torres Straits	----------	300/12		
R. et D.	1887	id.				
Lindgren	1898	Mer. de Chine	----------	312/16	48–120	16
Thiele	1903	Ternare	----------	300/15	petits	15
Dendy	1905	Ceylan	165	300/ 9	40–100/5–7	16
Laubenfels	1954	E. Palau	35-63	290/11	60–100/6–8	18–20
		Zamboanga	250–300	240–275/ 6–11	30–100/5–8	14–15

Par les mesures de ses spicules, *Ichnodonax kapne* Laub. peut a la rigueur, garder une valeur specifique.

Localite.—Zamboanga, littorale, parmi les coraux.

Distribution.—Indopacifique.

CLATHRIA BASILANA sp. nov. Fig. 11.

Eponge massive, rose rouge, caverneuse, reticulee, a la base, puis tubulaire, a surface tout a fait irreguliere, avec nombreuses depressions separees par des conules eleves ou des protuberances obtuses. On observe, au sommet de l'eponge, un enorme cratere terminal, beant, evase, large de 1.5–2 cm de diametre et egalement profond de 2 cm. L'eponge qui peut atteindre 6 cm de haut pour 2.5 cm de large, ou inversement, montre la fine structure reticulee caracteristique des Clathriidæ. Les fibres de 40 a 100 et meme 140 μ de diametre limitent des mailles de 500 a 1000 μ.

Spicules.—Styles principaux, lisses; courbes: 150 μ/5–6 μ.

Tornostrongyles flexueux, greles et droits, a tete epineuses, couvertes de quelques tres fines epines: 175 μ/3–4 μ.

Acanthostyles droits, a epines rares dans la region proximale et nombreuses vers les extremetes: 70–80 μ/5–6 μ.

Isocheles palmes de 2 tailles: 8 μ et 12–14 μ.

Localite.—Zamboanga, Jolo, Basilan; plusieurs brasses, parmi les coraux.

TENACIA FRONDIFERA (Bowerbank). **Figs. 12 et 13.**

T. frondifera (Bowerbank) BURTON et RAO (1932).

Deux specimens de cette espece assez polymorphe. Le premier, massif, est creux et compose d'un lacis de trabecules de 2 mm, entourant des mailles de 4–5 mm environ. Le tout represente un tres beau grillage dresse sur une base renflee et aplatie et termine en une cheminee distale courte. Chaque trabecule est lui meme forme d'un reseau de fibers que entourent des cavites de 300 μ de diametre. Les fibres assez epaisses mesurent 150 μ.

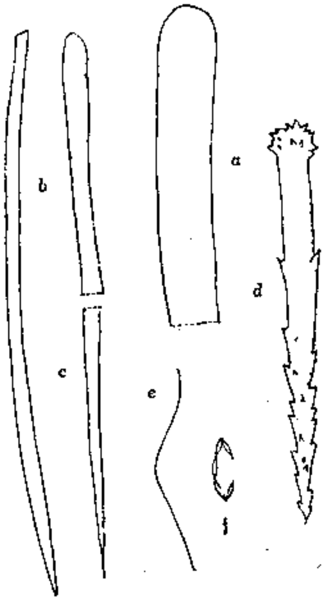


FIG. 12. Spicules de *Tenacia frondifera* (Bow.) Specimens 2: *a*, Styles; *b*, style secondaire; *c*, style secondaire; *d*, acanthostyle; *e*, toxe; *f*, isochele palme.

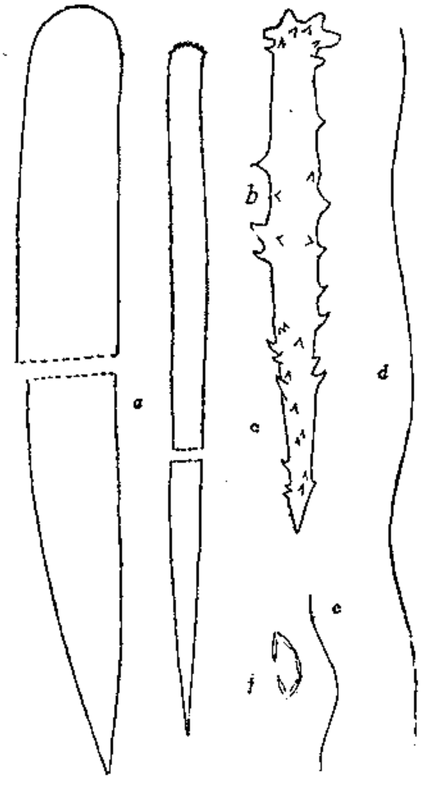


FIG. 13. Spicules de *Tenacia frondifera* (Bow.) Specimen 1: *a*, style 1; *b*, style accessoire; *c*, acanthostyle; *d*, trichite; *e*, toxe; *f*, isochele palme 1; *g*, isochele palme 2.

Le deuxieme specimen, en buisson, mesure 7/6 cm; il est compose de nombreux rameaux anastomoses, groupes en deux branches principales. Les rameaux sont termines en cones obtus de 2 mm et definissent un reseau irregulier a mailles de 5 mm. Chaque rameau est lui meme compose d'un lacis de fibres herissees de fins acanthostyles et entourent des cavites de 50–70 μ. Ces fibres ont un diametre moyen de 150–275 μ. Les spicules sont relativement peu nombreux dans les fibres.

Spicules.—Exemplaire 2: Styles principaux, forts lisses et courbes 150–220 μ/8–10 μ.

Styles dermiques greles, droits, a tete lisse, mesurant 200–240 μ sur 4 μ et petits styles courts a tete epineuse: 75–130 μ/2–3 μ.

Acanthostyles.—Herissants, courts, a region proximale presque nue: 50–70 μ/4–6 μ.

Isochele palmes rares: 9 μ.

Toxes.—Peu abondants: 30 μ environ.

Exemplaire 1.

Styles.—Principaux des fibres, lisses et courbes 140–240 μ /10–13 μ, avec une longueu moyenne de 200 μ.

Styles.—Dermiques ou intermediaires, droits, greles, dont certains ont une tete finement epineuse et mesurent 100–240 μ/3–5 μ et les autres a tete lisse sont rarement inferieurs a 200 μ.

Isocheles palmes de deux tailles, les une rares, 7 μ et les autres plus abondants et microscopiques 4 μ.

Toxes.—Tres rares: 25 μ environ.

Trichites de taille variable et plus ou moins courbes.

L'identification de ces deux specimens avec *Tenacia frondifera* Bow. est rendue difficile, en raison du manque de description critique des specimens jusqu'a present recoltes dans la zone indopacifique.

Localite.—Zamboanga, plusieurs brasses, sur coraux (*1*) et parmi les huitres perlieres (*2*).

TENACIA RIDLEYI (Lindgren).

Fig. 14.

Eponge massive: 160 × 25 × 84 mm dure, de couleur rouge vif, dressee en colonne, plus ou moins large et dont l'aspect exterieur est irregulierement torsade. Chaque brin de la torsade est bossele et peut se subdiviser en trabecules plus fins. La surface est obliquement hispide. Le reseau de trabecules internes limite des mailles de 400 μ a 1 mm la surface externe est recouverte d'un epais feutrage de styles droits et greles. Les fibres mesurent 50–100 μ de diametre et sont herissess d'acanthostyles assez tasses.

Spicules.—Styles principaux trapus, lisses, courbes dans leur moitie proximale, a pointe breve et diametre presque constant: 150–250 μ/8–15 μ avec un mode a 220 μ.

Styles dermiques a tete couverte d'un petit paquet d'epines 120–300 μ/4–6 μ.

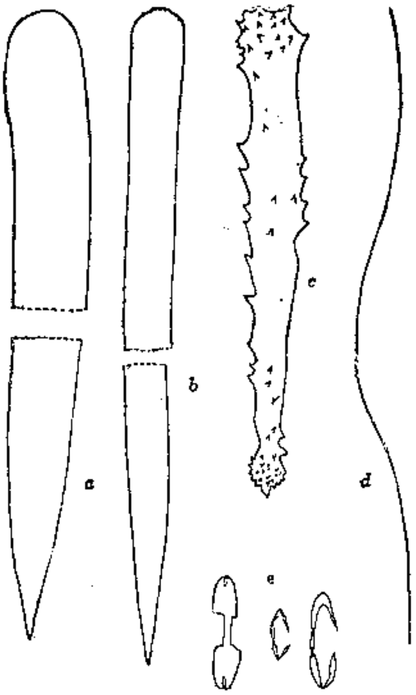


Fig. 14. Spicules de *Tenacia ridleyi* Lindgren): *a*, style 1; *b*, style accessoire; *c*, acanthostyle; *d*, toxe; *e*, isocheles palmes.

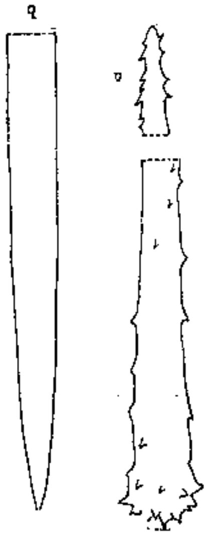


Fig. 15. Spicules d'*Echinodictyum asperum* Ridley et Dendy: *a*, acanthostyle; *b*, extremites d'oxes.

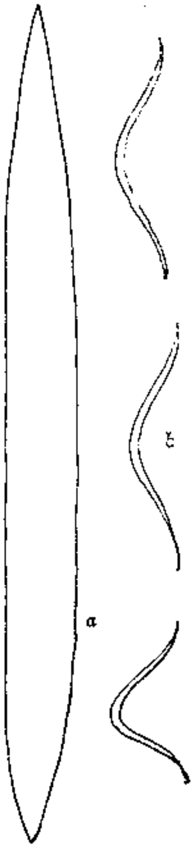


Fig. 16. Spicules de *Toxochalina robusta* Ridley: *a*, oxe; *b*, toxes.

Acanthostyles courts, dont les epines sont presqu'egalement reparties, un peu moins abondantes pourtant dans le tiers proximal. La pointe est obtuse et renflee et couverte de nombreuses petites epines serrees: 75 μ/ 5–6 μ.

Isocheles palmes.—De deux tailles: 9 et 15 μ.

Rhaphides toxiformes.—80–110 μ.

Ce specimens' apparente entroitement aux deux autres decrits par Lindgren sous le nom de *Rhaphidoplus ridleyi* et par Thiele sous le nom de *Rhaphidophlus erectus.*

Localite.—Taganak Island; Sulu, littorale, parmi les coraux.

Distribution.—Archipel indonesien.

ECHINODICTYUM ASPERUM Ridley et Dendy. Fig. 15.

Eponge grillagee mesurant 8 × 6 cm et haute de 1.5 cm, et formee de rameaux aplatis, larges de 3 mm, anastomoses limitant des mailles de 6 mm. De ce reseau de base s'elevent des branches dressees et a leur tour anastomosees. Chaque rameau est fait d'un grand nombre de fibres entremelees en lacis et soudees en de nombreux points. Chaque fibre est herissee d'acanthostyles regulierement espaces et mesure 80 a 130 μ de large et contient beaucoup de spicules et peu de spongine.

Spicules.—Oxes: droits ou courbes, reguliers, de diametre et longueur variable: 150–375 μ/5–20 μ.

Acanthostyles assez pointus et dont les epines sont surtout reparties sur la tete et vers la pointe, mais elles existent partout sur le spicules. Les epines sont recurvees: 140 μ/8–10 μ.

Localite.—Lucap Bay, Lingayen Gulf, a basse mer, sur le sable vasard.

Distribution.—Amboine, Torres Straits.

TOXOCHALINA ROBUSTA Ridley. Fig. 16.

Petite eponge massive, olivatre, rameuse, hautte de 4 cm avec extremites des rameaux obtuses, portant quelques larges oscules circulaires beants (1.5 a 3 mm de diametre) sur plusieurs generatrices.

Le reseau squelettique principal comporte des fibres bien developpees de 50–85 μ de diametre, avec moelle spiculifere de 15–25 μ. Il est irregulier au centre, mais rayonne vers la peripherie et ses mailles mesurent 500 μ environ. Le squelette dermique est un fin reseau a mailles triangulaires de fibres a partir de 15 μ.

Spicules.—Oxes, petits, presque droits, a pointes courtes, 110-125 μ/ 9 μ.

Toxes.—Assez epais, a flexion accusee, 30/8 μ et 23/10 μ.

Localite.—Zamboanga, plusieures brassez, attachee sur une huitre perliere.

Distribution.—Indopacifique.

GELLIUS RIDLEYI Hentschel. Fig. 17.

Eponge revetante, intemement liee a une algue: cet ensemble symbiotique se presente sous form de rameaux jaune ocre a section elliptique, de 0.5–1 cm de diametre environ, avec orifices osculaires nombreux et frequemment anastomoses.

Tout le squelette est constitue par l'algue ramifiee et les spicules de l'eponge plantes dans l'algue ou disperses irregulierement a sa surface.

Spicules.—Oxes courbes: 130–170 μ/ 4–6 μ.

Sigmas en C avec brusque courbure centrale analogue a celle des sigmas de *G. centrangulatus* Sollas: 16–17 μ.

Remarque.—Bowerbank [(1876) 771], Carter [(1878) 163] et Ridley [(1884) 426] signalent deja l'association symbiotique.

Gellius-algæ, que Carter Identifie a *Thamnoclonium flabelliforme.*

Pour Carter, I eponge est un *G. fibulatus* (Sdt.), pour Ridley il s'agit de *D. cymidormis* (Esper) avec oxes de 150–160 μ/5–7 μ et sigmas de 20/1–1.6 μ. Toutes ces eponges proviennent de Hong-Kong, Formosa et de l'Australie du Nord. Il semble que le *Gellius* puisse etre remplace par d'autres eponges symbiotiques comme en temoignent les observations de Hentschel (1909) qui signale l'existence d'une *Terpois symbioticus* sp. nov. en double symbiose avec des zoochlorelles et l'algue *Ceratodictyum spongiosum* Zanard Ridley suppose enfin que l'eponge decrite par Bowerbank [(1876) 771] sous le nom d'*Ophlitospongia fucoides* n'est qu'une suberitide, dont les fibres cornees ne sont que les ramifications de l'algue.

Localite.—Zamboanga et Lucap Bay, Lingayen Gulf, littorale, parmi les madrepores et sur sable vasard.

Distribution.—Hong-Kong, Formose, Australie.

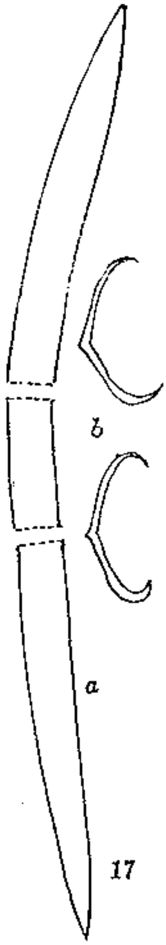
CALLYSPONGIA DIFFUSA (Ridley). Fig. 18.

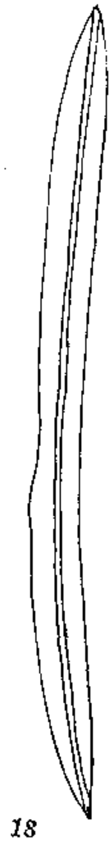
Fragment d'eponge, tres irregulier, a surface lisse ou veloutee, crausee de depressions tortueuses, le squelette principal est fait d'un lacis irregular de fibres primaires de 200 μ, bourrees de spicules et de fibres secondaires de 60 μ. Le sequelette dermique est compose de fibres de faible epaisseur ou les spicules sont rarement emboites, souvent plantes isolement ou en groupes, en petits faisceaux dresses qui donnent a la surface son aspect tres finement veloute. Les fibres principales avec spicules incorpores atteignent 50 μ et les fibres secondaires ne depassent guere 8–15 μ et de diametre.

Spicules.—Oxes de petite tailee: 90–110 μ/4–5 μ, regulierement courbes, avec un canal axial dilate.

Localite.—Ise Basilan, plusieurs brasses, sur huitres perlieres.

Distribution.—Indopacifique.





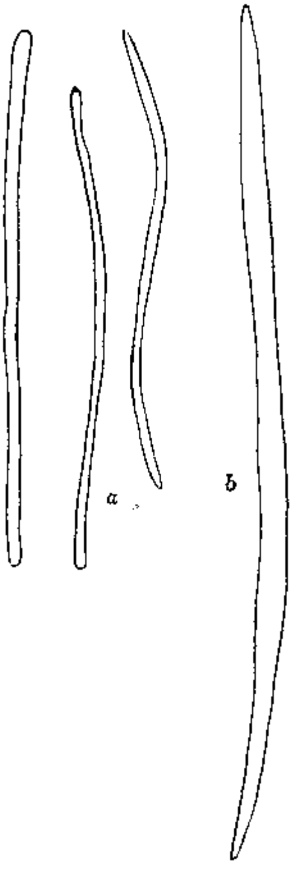


FIG. 17. Spicules de *Gellius ridleyi* Hentschel: *a*, oxe; *b*, sigmas: 18. Spicules de *Callyspongia diffusa* (Ridley).

FIG. 19. Spicules de *Callyspongia subarmigera* (Ridley).

CALLYSPONGIA SUBARMIGERA (Ridley). Fig. 19a et b.

Fragment d'eponge olivatre, a rameaux subcylindriques dont la surface est herissee de pointes irregulieres ou de proeminences obtuses. Le diametre des rameaux est de 5 mm. Les conules sont soutenus par la terminaison des fibres squelettiques. Le reseau dermique est regulier, a mailles principales polygonales; ses fibres primaires ont un diametre de 75–140 μ; les secondaires et tertiaires, respectivement 30 μ et 8–12 μ. Les mailles du reseau principal mesurant environ 1 mm.

Spicules.—Microstrongyles: rudimentaires, courts et greles, souvent flexueux: 60 μ/1 μ.

Localite.—Ise Basilan, littorale, parmi les coraux.

Remarque.—Par son aspect exterieur cet echantillon s'apparente etroitement a *C. subarmigera* (Ridley), mais sa spiculation est quelque peu aberrante. Il existe en revanche, dans la collection de Professeur Domantay, un autre echantillon dont l'aspect exterieur est moins caracteristique et al spiculation beaucoup plus typique et dont voici la description.

Petite eponge jaunatre claire, legere et creuse en forme d'U, a surface lisse, herissee de part en part de petits conules peu eleves qui correspondent aux fibres principales du reseau squelettique. Le reseau profond est irregulier et le reseau dermique specialise est compose de nombreuses petites fibres tendues entre les conules. Les mailles dermiques mesurent 70–80 μ et les fibres primaires, 80–110 μ, secondaires: 50–70 μ et tertiaires: 10 a 50 μ.

Spicules.—Oxes, tres nombreux, regulierement courbes, rarement flexueux ou toxiformes: 80–100 μ/3 μ.

Localite.—Zamboanga, plusieurs brasses, sur huitre perliere.

Distribution.—Indopacifique.

HALICLONA ZAMBOANGÆ sp. nov. Fig. 20.

Petite eponge verte en plaque tordue en eventail, dont la charpente est faite de fibres rayonnantes. La surface est veloutee et porte des oscules circulaires sur sa partie concave. Les oscules mesurent 600 μ a 1 mm et sont espaces de 2–3 mm. La consistance est ferme. Les fibres principales atteignent 140 μ de diametre et les fibres secondaires 30 μ.

Spicules.—Oxes courbes, a canal axial souvent dilate et pointes effilees: 120–150 μ/4–6 μ; d'autres, tres greles et plus courbes ou flexueux: 120–130 μ/ 3 μ.

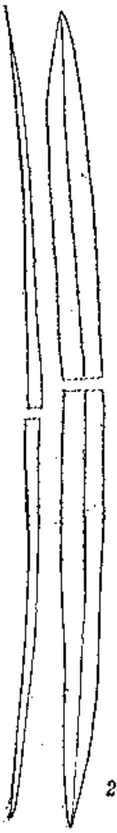
Localite.—Zamboanga, littorale, parmi les coraux.

HALICLONA (RENICLONA) SUBCAPITATA sp. nov. Fig. 21.

Eponge de couleur jaune paille, assez informe, aplatie, un peu epaisse, charnue et tres friable a l'etat sec, elle est soutenue par un tres grand nombre de fibres longitudinales qui courent cote a cote, separees par des masses charnues tres molles. Les fibres atteignent 100 a 275 μ de diametre et sont reliees par un simple reseau unispicule.

Spicules.—Oxes legerement courbes, a faible canal axial et extremites marquees par une sorte de leger renflement qui fait suite a un petit etranglement et ces extremites sont obtuses 130–160 μ sur 5–7 μ.

Localite.—Zamboanga, plusieurs brasses, sur coraux.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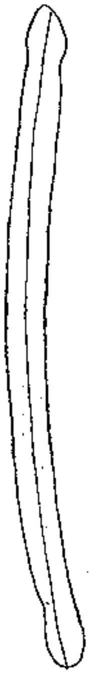
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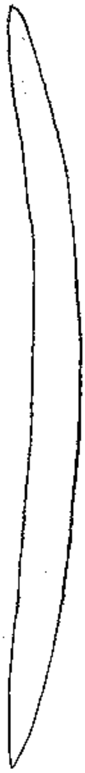
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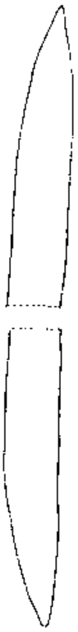

FIG. 20. Spicules de *Haliclona zamboangae* sp. nov.
21. Spicules de *Haliclona* (*Reniclona*) *subcapitata* sp. nov.
22. Spicules d'*Adocia* sp.

FIG. 23. Spicules de *Petrosia similis* Ridley et Dendy.

ADOCIA sp.

Fig. 22.

Eponge fragile, fixee sur une sorte de pedicelle et revetante, en partie, sur Zosteres, puis terminee par divers rameaux tubulaires avec oscules beants sur leur partie convexe. Tubes de 4 mm de diametre et Oscules de 1.5 mm.

La surface est liss, avec une membrane dermique transparente, qui permet d'apercervoir des fibres spiculaires longitudinales, courant sous la surface et anastomosees en de nombreaux points, constituant ainsi un reseau tangential. Le squelette dermique constitue un reseau isodictyal regulier, unispicules, sans spongine. Les fibres longitudinales et principales du squelette mesurent 30–50 μ de diametre et sont reunies par un reseau unispicules.

Spicules.—Oxes lisses regulierement courbes: 90–100 μ/ 4–6 μ.

Localite.—Ise Basilan, plusieurs brasses, sur huitre perliere.

PETROSIA SIMILIS Ridley et Dendy. Fig. 23.

Eponge massive, dure, dressee, haute de 12 cm et large de 3.5 cm de couleur brun roux fonce, bifurquee, avec une branche terminale renflee en massue. La surface est assez egale et veloutee et porte des oscules epars, beants d'l a 3 mm. Le squelette est compose d'oxes tres nombreux groupes en trabecules, reticules ou entrecroises en tous sens.

Spicules.—Oxes, plus ou moins longs et forts, normalement courbes, 250 μ/11 μ avec quelques uns plus petits: 150 μ.

Localite.—Zamboanga, littorale parmi les coraux.

DICTYOCERATIDES

SPONGIA OFFICINALIS Linnæus.

Fragment d'eponge de toilette (90/45/40) mm avec deux oscules de 7 mm de diametre. Nombreuses cheminees poriferes equidistantes, dont le diametre oscille entre 1 et 1.5 mm.

Le squelette est forme d'un reseau de fibres secondaires, sans inclusions de 17–25 μ de diametre. Les mailles du reseau varient entre 30 et 60 μ.

Localite.—Sulu Sea, littorale, parmi les coraux.

HIPPOSPONGIA FISTULOSA Lendenfeld

Eponge massive, ocre, aplatie sur le support en un large coussin lobuliforme, dont les lobes ont 5 mm de haut et 1, 1, 5 cm de large. Cette base prote des cheminees greles, inegalement hautes et creuses: 2 a 3.5 cm.

En profondeur, le reseau squelettique est forme de fibres cornees primaires de 20–25 μ se ramifiant lachement, et s'amincissant en fibres secondaires de 8–10 μ. Le reseau squelettique dermique est tres dense et les fibres primaires de 20–25 μ, limitent des mailles serrees de 60–90 μ, pendant que les fibres secondaires de 4–5 μ restent a l'etat d'ebauches dans les mailles et fusionnent rarement. Les mailles du reseau principal peuvent atteindre par endroit 400 μ de diametre maximum.

Localite.—Zamboanga, littorale, dans les coraux.

Distribution.—Cotes australiennes.

CARTERISPONGIA RADIATA Hyatt.

1 specimen de cette eponge ramifee, dichotome, en un plan et dont l'allure generale est celle d'un eventail haut de 13 cm et large au sommet de 11 cm; les deux faces sillonnees.

Localite.—Zamboanga, littorale, parmi les recifs.

PHYLLOSPONGIA PAPYRACEA (Esper).

Eponge lamellaire, en eventail, marquee par une fissure midiane et distale et traversee par deux courtes cavites. Le pedicelle est court et solide. Le squelette est fait de fibres longitudinales et d'un reseau a mailles plus ou moins triangulaires avec des fibres prilaires de 40 μ et des fibres secondaires de 15 μ. Les fibres longitudinales seules sont garnies d'inclusions.

Localite.—Zamboanga, littorale, parmi les coraux.

Distribution.—Indopacifique.

PHYLLOSPONGIA ECTOSCULA sp. nov.

Eponge cyathiforme, assez fermee, portee par un court pedicelle elargi et largement evasee dans la region distale. Les deux surfaces externe et interne ont une structure notablement differente.

La surface externe est surtout marquee par la presence de cavites osculaires un peu elliptiques dont l'orifice est entoure d'une fine membrane et porte sur une petie proeminence. Elle est d'autre part creusee par un certain nombre de depressions pseudo-osculaires, profondes et closes, elliptiques ou circulaires. Les oscules ont un diametre d'l ou 2 mm et les depressions: 3–4 mm. A premiere vue toute la surface externe est finement poncutee, mais les pores se groupent suivant les regions, par petites plages ou suivant des lignes entrecroisees. Toute la surface externe est veloutee et egale.

La surface interne est recouverte d'une fine couche de corps etrangers agglomeres qui lui donnet l'aspect de la vase craquelee lorsqu'elle est a l'etat sec. Elle porte un certain nombre de protuberances coniques et quelques crateres occupes par des Cirripedes opercules.

Le squelette est fait d'un reseau extremement dense de fibres cornees, fibres primaires de 40 μ et fibres secondaires de 15 μ. Les fibres ont une surface irregulierement piquetee et les mailles sont tres irregulieres. On observe des corps etrangers, cailloux et spicules, mais hors des fibres, colles seulement contre elles.

Localite.—Zamboanga, littorale, parmi les coraux.

HIRCINIA DENDROIDES (Polejaeff).

Eponge cornee, brune, ramifiee, dont les quelques rameaux sont subcylindriques, un peu coniques ou aplatis aux estremites et s'attachent au support, en differents points. La surface est herissee de conules de 2 mm de haut, a peu pres equidistants, espaces tous les 2 mm, soutenus par l'extremite des fibres. La membrane dermique est tendue et lisse. Les fibres primaires et secondaires contiennent quelques inclussions et mesurent 40 a 150 μ. Toute l'eponge est bourree de filaments hirciniens de 4–5 μ de diametre et termines par des boules de 7–8 μ.

Localite.—Coron Bay, Palawan, littorale, parmi les coraux.

Distribution.—Indopacifique.

BIBLIOGRAPHIE

1. ANNANDALE, N. Sponges from brackish water on Verlaten Island near Krakatau. Treubia **5** (1924) 402–407.

2. BAAR, R. Hornschwanme aus dem Pacific. Ergebnisse einer Reise nach dem Pacific Schauinsland 1896–97. Zool. Jahrb. Abt. Syst. **19** (1903) 27–36.

3a. BOWERBANK, J. S. Contributions to a General History of the Spongiadæ. Part 8. Proc. Zool. Soc. London (1876) 768–775.

3. BOWERBANK, J. S. Description of five new species of sponges discovered by A. M. Meyer on the Philippine Islands and New Guinea. Proc. Zool. Soc. London (1877) 456–464.

5. BRONDSTED, H. V. Neue Schwamme aus Amoy an der Formosa Strasse. Zool. Anz. **81** (1929) 224–229.

6. BRONDSTED, H. V. Resultats scientifiques du voyage aux Indes Neerlandaises de LL. AA. RR. le Prince et la Princesse Leopold de Belgique. Sponges. Mem. Mus. Hist. Nat. Belgique, Hors (2) **15** (1934) 3–27.

7. BURTON, M. Sponges. Great barrier reef expedition 1928–29. Sci. Rept. Brit. Mus. Nat. Hist. **14** (1934) 513–614.

8. BURTON, M. Porifera of Krusadai Island. Bull. Madras Gov. Mus. (2) pt. 4 **1** (1937) 1–58.

9. BURTON, M., and H. S. RAO. Reports on the shallow water marine sponges in the collection of the Indian Museum. Rec. Indian Mus. **34** (1932) 299–356.

10. CARTER, H. J. Description of two new sponges from the Philippine Islands. Ann. Mag. Nat. Hist. (4) 10 (1872) 100–113.
11. CARTER, H. J. Parasites of the spongida. Ann. Mag. Nat. Hist. (5) 2 (1878) 157–172.
12. CARTER, H. J. Descriptions of sponges from the neighborhood of Port Philip Head, South Australia. Ann. Mag. Nat. Hist. (5) 15–18 (1885–86).
13. DENDY, A. Report on the sponges, collected by Fr. Herdman at Ceylon in 1902. Herdman Rep. Pearl Oyster Fish. Suppl. 18 (1905) 57–246.
14. DENDY, A. Report on the sigmatotetraxonida collected by H. M. S. "Sealark" in the Indian Ocean. Trans. Linn. Soc. London 18 (1921) 1–164.
15. DRAGNEWITSCH, P. Spongien von Singapore. Zool. Jahrb. Abt. Syst. 23 (1906) 439–448.
16. GRAY, J. E. On a new genus of hexaradiate and other sponges discovered by Dr. A. Meyer. Ann. Mag. Nat. Hist. (4) 10 (1872) 134–139.
17. HALLMAN, E. F. Report on the sponges obtained by F. I. S. "Endeavuor" on the Coast of New South Wales, Victoria, South Australia, Queensland and Tasmania, I. Zool, Res. Fish. Exp. Endeavour, Pt. 2 (1912) 117–300.
18. HENTSCHEL, E. Tetraxonida. 1 Teil und 2 Teil. In Michaelsen et Hartmeyer, Fauna Sudwest Australiens, Pt. 21 2 (1909) 347–402; 279–393.
19. HENTSCHEL, E. Kiesel und Hornschwamme der Aru und Kei Inseln. Abh. Senckenb. Naturf. Ges. 34 (1912).
20. HIGGINS, T. On some new sponges from the Philippine Islands, Proc. Lit. Phil. Soc. Liverpool 29 (1875) 51–52.
21. KIESCHNICK, O. Kiesel schwamme von Amboina. Denks. Medic. Naturw. Ges. Iena 8 (1900) 545–582.
22. KIRKPATRICK, R. Description of sponges from Funafuti. Ann. Mag. Nat. Hist. (7) 6 (1900) 345–362.
23. KIRKPATRICK, R. On the sponges of Christmas Island. Proc. Zool. Soc. London (1900) 127–141.
24. LAUBENFELS, M. W. DE. A collection of sponges from Puerto Galera, Mindoro, Philippine Islands. Philip. Jour. Sci. 56 (1935) 327–337.
25. LAUBENFELS, M. W. DE. A discussion of the sponge fauna of the Dry Tortugas, in particular and the West Indies in general . . . Publ. Carnegie Inst. Wash. 467 (1936) 1–225.
26. LAUBENFELS, M. W. DE. The order Keratosa of the Phylum Porifera A monographic study. Allan Hancock Found. Publ. 3 1948) 1–217.
27. LAUBENFELS, M. W. DE. New sponges from the Yap Archipelago. Pacific Sci. X 3 (1949) 124–126.
28. LAUBENFELS, M. W. DE. Sponges of Kaneohe Bay, Oahu. Pacific Sci. 4 (1950) 3–36.
29. LAUBENFELS, M. W. DE. Sponges of the Island of Hawaii. Pacific Sci. 5 (1951) 256–271.
30. LAUBENFELS, M. W. DE. The sponges of the West Central Pacific. Oregon State Monogr. Zool. 7 (1954) 1–306.

31. LENDENFELD, R. VON. A Monograph of the Horny Sponges. London (1889).
32. LEPWOHL, F. Japanisene tetraxonida. I, Sigmatophora. II, Astrophora metastrosa. III, Euastrosa. IV, Sterrastrosa. Tokyo Jour. Coll. Sci. Art. 2 35 (1914) 1–116, art. 5:1–170.
33. LINDGREN, H. G. Beitrag zur Kenntnis der spongienfauna der Malayischen Archipels und der Chinesichen Meere. Zool. Jahrb. Abt. Syst. 11 (1898) 283–287.
34. POLEJAEFF, N. Report on the Keratosa, collected by H. M. S. Challenger during the years 1873–76. Rept. Challenger Zool. 9 (1884) 1–88.
35. RAO, H. S. Indian and Ceylon sponges of the Naturhistoriska Riksmuseet, Stockholm, collected by K. Fristedt. Rec. Ind. Mus. 43 (1941) 417–469.
36. RIDLEY, S. O. Spongiida. Rep. Zool. Coll. Voy. H. M. S. "Alert" (1884) 366–482, 582–630.
37. RIDLEY, S. O., and A. DENDY. Monaxonida collected by H. M. S. Challenger during the years 1873–76. Rep. Challenger Zool. 20 (1887) 1–275.
38. SCHULZ, E. Die hornschwamme von Thursday Island und Amboina. Denks. Medic. Naturw. Ges., Iena 8 (1900) 525–544.
39. SCHULZ, E. Hornschwamme von Ternate. Abh. Senckenb. Naturf. Ges. 24 (1898) 185–188.
40. SEMPER, C. Einige neue Kieselschwamme der Philippinen. Verh. Phys. Med. Ges. Wuezburg. 1 (1868) 29–30, Ann. Mag. Nat. Hist. (4) 2 (1868) 372–373.
41. SOLLAS, I. B. J. On the sponges collected during the Skeat Expedition to the Malay Peninsula 1899–1900. Proc. Zool. Soc. London Pt. 1 2 (1902) 210–221.
42. SOLLAS, W. J. Report on the Tetractinellida collected by H. M. S. Challenger, during the years 1873–76. Rept. Challenger Zool. 25 (1888) 1–458.
43. THIELE, J. Studien uber Pazifische Spongien. Zoologica 24 (1898–99) 1–72; 1–33.
44. THIELE, J. Kieselschwamme von Ternate. Abh. Senckenb. Naturf. Ges. 25 (1900–03) 19–80; 933–968.
45. TOPSENT, E. Spongiaires de la Baie d'Amboine. Rev. Suisse Zool. 4 (1897) 421–487.
46. TOPSENT, E. Sur quelques Clionides (Eponges) du Pacifique. Soc. Biogeog. 4 (1934) 235–236.
47. VOSMAER, G. C. J. The Porifera of the Siboga Expedition II. The genus Spiratrella. Siboga Exped. 6 A (1911) 1–69.
48. WILSON, H. V. Siliceous and horny sponges collected by the U. S. Fisheries Steamer "Albatross" during the Philippine Expedition 1907–10. Bull. U. S. Nat. Mus. 100 (1925) 273–506.

BOOK REVIEWS

Books reviewed in this section represent a selection from those received from time to time by the National Institute of Science and Technology and the Philippine Automic Energy Commission, two sister agencies under the National Science Development Board.

Annual Review of Nuclear Science, vol. 9. Edited by Emilio Segre and Leonard Schiff. California, Annual Reviews, Inc., c1959. vii, 625 p. Price, $7.50.

This excellent collection of review articles on the latest trends in nuclear physics, nuclear chemistry and electronics will be of immense value to scientists engaged in these various fields of research. Those who are interested in the eventual use of nuclear energy as a source of electricity and heat will find the three articles on fusion and fission power very interesting. From them it can be estimated how long a time it would take before nuclear power becomes competitive with conventional power.

The biological effects of ionizing radiation are treated in the concluding chapters.—M.R.E.

Calculus with analytic geometry. By Donald E. Richmond, Readings, Mass., Addison-Wesley Publishing Company, Inc., 1959. xv, 458 p. Price, $8.75.

This book is intended as a textbook for students taking calculus with a good background of secondary mathematics but with inadequate foundation in analytic geometry. The author has made every effort to increase the understandability of the text, introducing analytic geometry as much as needed. Sufficient material is included so that all theorems may be proved rigorously. Mostly every topic discussed is followed by examples and is closed with problems to be solved. The principal aim is to enable the student to participate actively in building up his understanding of the subject matter.

The first five chapters of this book deal with concepts of functions, limits, continuity, derivatives, maxima and minima, time rates, area functions, and transcendental functions (exponential, logarithmic, trigonometric, inverse trigonometric, and hyperbolic functions). The last eight chapters deal with integration procedures, definite integrals, improper integrals, Laplace transforms, linear differential equations, vectors, conics, multiple integration with particular emphasis on volumes, approximation of functions by polynomials, indeterminate forms and infinite series.

This book will be useful as a source of review material for the more advanced reader who is seeking to become familiar with, or brush up on, one or more mathematical techniques. It will be a good book also for a fresher course in advanced mathematics for students who intend to take Master of Science in mathematics or statistics.—P.L.

Atomic Age Physics. By Henry Semat and Henry White. New York, Rinehart and Co., c1959. vii, 230 p. Price, $2.00.

In an attempt to popularize atomic and nuclear science, Doctor White and Doctor Semat, two physics professors wrote for easy reading this book on one of the most stimulating subjects of our time. It covers the lectures given in the second half of the American daily television sessions of "Continental Classroom" of which Doctor White is the principal teacher.

The book explains the basic concepts of atomic and nuclear physics in a concise but very clear manner. This is especially true for the chapters on electronic structure of the atom, energy levels, electron and nuclear spin and their vector models. The subject matter has been presented in such an orderly manner that the conclusion of one chapter simply leads to the beginning of the next.

Atomic Age Physics would be very good introductory material for college students on atomic and nuclear science.—R.B.B.

Encyclopedic Dictionary of Electronics and Nuclear Engineering. By Robert I. Sarbacher. Englewood Cliffs, N.J., Prentice-Hall, Inc., 1959. x, 1417 p., diag. Price $35.00.

The most comprehensive and most up-to-date information aid that has perhaps come out in the rapidly changing fields of electronics and nuclear engineering is this scholarly encyclopedic dictionary. Almost all current terms and definitions, abbreviations, clear descriptions and hundreds of special diagrams of equipments, elements, components and systems employed in these subject areas have been compiled in one alphabet for easy consultation. Cross reference within the text have been provided for better access to definitions.

Dr. Robert I. Sarbacher, an international authority on engineering and applied physics, has applied in this volume his substantial background and personal insight to integrate, equate and extend the use for standardized terminology as used by professional societies like the U.S. Atomic Energy Commission, American Standards Association, and many others.—R.P.

Establishing International Control of Nuclear Testing. Washington D.C., National Planning Association, July 21, 1958. 20 p. (Special Report No. 50.) With 2 supplements issued on Nov. 3, 1958 and Nov. 8, 1959. Price, $0.40.

This report published by the National Planning Association contains a statement by the Special Project Committee on Security Through Arms Control. It stresses the need for establishing a means by which nuclear explosions can be controlled internationally and insists that controls must be effectively enforced. Recommendations to this end include the installation and operation of a monitoring system by an international agency for detecting unauthorized nuclear tests.

Military security is extensively discussed as a basic consideration in the nuclear explosion issue. Some of the conclusions made by the committee are: (*a*) that a retaliatory "sufficiency," and not further nuclear testing, can be adequate for insuring security; and (*b*) an "opening up" of Russia for inspection would be better than improving the present nuclear capabilities.

Testing nuclear weapons produces radioactive elements in the atmosphere which constitute a health hazard. For this reason it is suggested that the damage expected from fallout, i.e., the deposition of radioactive materials resulting from a nuclear explosion, should be considered in making decisions concerning nuclear testing.

Recent recommendations concerning nuclear test suspension and the effective control of nuclear explosions are presented in the two supplements.—N.C.Z.

Health Physics. Vol. 1. Edited by W.G. Marley and K.Z. Morgan. London, Pergamon Press, 1959. x, 602 p. (Progress in nuclear energy series, XII.) Price, $15.00.

Health Physics is a collection of selected papers concerned with the various aspects of radiological health and safety in atomic energy presented in the Second International Conference on the Peaceful Uses of Atomic Energy, Geneva. Since the range of topics covered under the heading "Health Physics" is nowadays so wide, the editors have deemed it desirable in this collection to include many papers on the important outlaying branches of the subject, e.g., food chains and meteorology.

The papers are grouped in a logical sequence under six headings; namely, (*1*) permissible levels of exposure to ionizing radiations and radioactive materials; (*2*) operational experience of radiations protection in uranium mines, atomic energy plants and factories using radioisotopes; (*3*) radiation measurement and dosimetry; (*4*) radioactive measurements in human beings; (*5*) meteorological aspects of atomic energy and the evaluation of reactor accident hazards; and (*6*) environmental hazards and the disposal of radioactive wastes.

Well edited and well documented, this volume is so far the most comprehensive work published on the subject.—N.C.Z.

Introduction to Atomic and Nuclear Physics. By Henry Semat. 3rd ed. rev. and enl. of Introduction to Atomic Physics. New York, Reading, Massachusetts, Addison-Wesley Publishing Company, Inc., Rinehart and Co., c1954. xii, 561 p., illus. Price, $6.50.

Atomic and nuclear physics are two very broad fields of science. In attempting to explain them, one may become so involved in discussing related topics that there is always the danger of losing the original trend of thought. In this respect, the author had succeeded in confining his discussions to those related topics which will lead to a better understanding of the subject matter.

The textbook is divided into three parts. The first part deals mainly with the basic topics which are the foundations of atomic and nuclear physics. Part two is devoted to atomic physics. The chapter on the hydrogen atom, atomic spectra, and electron distribution is noteworthy for its simplicity and clarity attained without sacrificing completeness. The last part gives an introduction to nuclear physics.

Without doubt this book provides an excellent introduction to the difficult field of atomic and nuclear physics.—R.B.B.

The Lloyd William Taylor Manual of Advanced Undergraduate Experiments in Physics. By Thomas Benjamin Brown, editor-in-chief. Reading, Massachusetts, addison-Wesley Publishing Company, Inc., c1959. xxv, 550 p. Price $9.50.

The American Association of Physics Teachers has issued this manual as a memorial to the late Lloyd William Taylor, physics professor and head of department of Oberlin College, Ohio. Rather than present the usual type of laboratory manual in physics, to be used by students, the committee of teacher-editors in charge of preparing the book chose the teachers' viewpoint and prepared a manual to assist fellow teachers everywhere in planning and setting up physics laboratory work for college students of junior-senior level.

The book is mainly a collection of well selected and well edited experiments covering all the major fields of physics, including electronics and nuclear physics, with the necessary descriptions and work procedures. Preference in the selection was given to less familiar experiments which had been developed locally but which are useful and should be known widely. Many of the experiments require inexpensive equipment; but others require more elaborate setups.

Although intended primarily for teachers, the manual will be very helpful to students who are intent in mastering the subject to aid them in their scientific and engineering studies. Its frequent citations of useful references in the text and its reference list at the end of each chapter provide means for thorough research for the understanding of details.

To work out all the experiments intelligently, the students should possess a deeper understanding of the basic principles in physics and mathematics and have as well the guidance of a physics instructor, who is better acquainted with the principles and instrumentation involved.—A.J. de L.

Elements of Modern Mathematics. By Kenneth O. May. Reading, Massachusetts, Addison-Wesley Publishing Company, Inc., c1959. xvi, 607 p. Price $7.50.

This book is a useful tool for understanding the basic concepts of mathematics. Each chapter carries a great deal of discussion and exercises intended to make knowledge of the subject much easier to acquire, organize, and apply.

The beginner with only elementary algebra and geometry as a background, who wishes to proceed and become acquainted with the basic concepts of calculus, probability, and the more abstract theories of modern mathematics, will find the book helpful, encouraging, and interesting. It aims to help him obtain a "modest mathematical literacy," which consists of an orientation in modern mathematics, the acquisition of a basic mathematical vocabulary, and some facility in the use of mathematical concepts and symbols.

The presentation is done in a systematic, philosophical, and logical manner, with an easy-to-understand language. The modern mathematical terms should be very valuable for students who wish to train themselves as scientists, engineers, or mathematicians.

The numerous problems and exercises, together with their solutions and answers, arouse reader participation and induce energetic study to develop clear thinking, visualization, and understanding of modern mathematical concepts.—A.J. de L.

College Physics. By Francis Weston Sears and Mark W. Zemanski. Third edition. Reading, Massachusetts, Addison-Wesley Publishing Company, Inc., c1959. xxxiii, 1024 p. Price, $6.75.

This is the third edition in one volume of the popular known physics textbook, College Physics, which has been issued earlier in two separate parts. Both Part 1, which deals with mechanics, heat and sound, and Part 2, which discusses electricity and magnetism, light, and atomic physics, are now included in this edition.

The success of previous editions has spurred the authors in putting out the present edition which, while retaining the basic plan, embodies the suggestions of teachers in the field and includes changes that make the subject more teachable and understandable. These changes include improvement of figures and illustrations, rearrangement of problems for study, and addition of new materials. The new subjects related to fluid dynamics and nuclear physics give the text a realistic, modern approach. The widened use of the metric system of dimensions is a welcome improvement. It makes the study of physics more in keeping with modern science trends.

The level of mathematical treatment, however, remains the same to suit students whose preparations for the course are confined to algebra and trigonometry. The book, nevertheless, prepares them for higher courses which are essential for science and engineering. Several tables which contain useful and frequently needed data by students and professionals alike are appended.—A.J. de L.

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INDEX

[New names and new combinations are printed in *italics.*]

A

Abelmoschus esculentus sensu Merr., 260.
  manihot (Linn.) Medic. subsp. manihot fo. speculatus (Bakh.) Borss., 260.
Abitsuelas, 223.
Abrus precatorius Linn., 246, 248.
Acacia farnesiana (Linn.) Willd., 247, 249, 250.
Acanthodoryx Levi, 517.
  fibrosa Levi, *510*, 517.
Acetabularia calyculus Quoy & Gaim., 433.
  dentata Solms-Laub., 433.
  major Mart., 433.
  philippinensis Gilb., 433.
Adocia sp., 510, 528.
Aegle marmelos Cor., 247.
Aegophagamyia, 299.
Agat, 24.
Alagasi, 247.
Alagaw, 247.
ALEXANDER, CHARLES P. New or little-known Tipulidæ from eastern Asia (Diptera), XLVI, 137.
Alimpuyas, 19.
Alimpuying, 19.
Allium cepa Linn., 223, 248.
  porrum Linn., 223.
  sativum Linn., 223, 247.
  tuberosum Roxb., 223.
Alpinia Roxb., 4, 15.
  cernua Naves, 13.
  elegans K. Schum., 11.
  grandis K. Schum., 16.
  magnifica Rosc., 29.
  mutica Roxb., 12.
  purpurata (Viell.) K. Schum., 15.
  speciosa (Wendl.) K. Schum., 13.
Alternanthera sessilis (Linn.) R. Br., 223.
Alugbati, 222, 223.
Amaranthus viridis Linn., 223.
Amomum curcuma Jacq., 20.
  zedoaria Berg., 18.
  zerumbet Linn., 27.
  zingiber Linn., 24.
Ampalaya, 223.
Anadyomenaceæ, 425.
Anadyomene brownii Gray, 427.
  eseptata Gilb., 425-427.
  flabellata Dick., 427.
  leclancherii Decais., 427.
  plicata C. Ag., 427.
  stellata (Wulf.) C. Ag., 427.
  Wrightii Gray, 428.
Anamirta cocculus (Linn.) W. & A., 240.
Angai, 20.
Anisopter thrifera, 43.
Anitos, 130.
Anopheles minimus flavirostris, 374, 375, 377, 382, 384, 387, 394.
Ansonia muelleri (Bowl.), 338, 343.
Antocha (Antocha) *libitina* Alex., *159*, *160*.
  (Antocha) nebulipennis Alex., 160.
  (Antocha) perstudiosa Alex., 160.
  (Antocha) studiosa Alex., 160.
Apium graveolens Linn., 223.
ARAULLO, TRINITA P., *see* YOGORE, CABRERA, ARAULLO, and CABALTEJA.
Aroma, 247.
Asclepias curassavica Linn., 247.
Asparagus officinalis Linn., 247.
Athyrium esculentum (Retz.) Copel., 223.
Atylotus, 283.
Averrhoa bilimbi Linn., 223.
Avrainvillea erecta (Berk.) A. & E. S. Gepp, 442.

B

Bael, 247.
Bago, 223.
Balabat, 247.
Balatong, 223.
Balauag, 27.
Balsa, 43, 46.
Bambusa spinosa Blm., 223, 248-250.
  vulgaris Schrad., 246, 248.
Banaba, 355.
Bangliu, 6.
Bankoro, 247.
Banksia speciosa Koem., 36.
Barak, 6, 19, 20.
Barik, 27.
Basella rubra Linn., 223.
Baseng, 24.
Bauang, 223.
Bauhinia malabarica Roxb., 223.
Bedbed, 130.
Benincasa hispida (Thurg.) Cogn., 248.
Beta vulgaris Linn., 223.
Biophytum sensitivum (Linn.) DC, 246, 248.
Blodgettia borneti Wright, 429.
Boergesenia Forbessii (Harv.) Feldm., 420.
Bogo, 247.
Bogombon, 11.
Bolon, 19.
BONECILIO, E., *see* SOLIVEN and BONECILIO.

Boodlea composita (Harv.) Brand, 421, 421.
  paradoxa, 424.
Boodleaceæ, 421.
Bornetella nitida (Harv.) Mun.-Chalm., 433.
  sphaerica (Zanard.) Solms-Laub., 433.
Bouvieromyiini, 285.
Brassica cernua (Thunb.) For. and Hensl., 223.
  chinensis Linn., 223.
  integrifolia O. E. Schulz., 223.
  oleracea Linn. var. acephala DC, 223.
  oleracea Linn. var. capitata Linn., 223.
Brood-leafed costus, 33.
Brotia asperata, 364.
Bruinsmia Boerl. et Koord., 121.
  styracoides Boerl. & Koord., 121.
Brunettia Ann., 501.
  key to the Japanese species of, 501.
  lucidisquama Tok., *503*.
  spinistoma Tok. et Ets., 505.
Bryophyllum pinnatum (Lam.) Kurz., 246, 248.
Bryopsidaceæ, 434.
Bryopsis harveyana, 435.
  indica A. & E. S. Gepp, 434.
  pennata var. secunda (Harv.) Coll. & Harv. 434.
Buboi-gubat, 247.
BUENAVENTURA, AMPARO, *see* MONSERRAT and BUENAVENTURA.
Bulak-damo, 247.
BUÑAG, RUBEN D., BENJAMIN M. RIGOR, LEONARDO G. TAN GATUE, WILLIAM R. REOTUTAR, and ROMULO GUEVARRA. The effects of hypoglycemia induced by agents other than exogenous insulin on duodenal motility in dogs under morphine-chloralose anesthesia, II. Lagerstromia speciosa (Linn.), 355.
Bunga-bunga, 222, 223.
Butuan, 247.

C

CABALTEJA, ERNESTO F., *see* YOGORE, CABRERA, ARAULLO, and CABALTEJA.
Cabbage, 223.
CABRERA, BENJAMIN D., *see* YOGORE, CABRERA, ARAULLO, and CABALTEJA.
Caesalpinna crista Linn., 247.
Callyspongia diffusa (Ridl.), 510, 525.
  subarmigera (Ridl.), 510, 526.
Cañagria, 31.
Canela, 247.
Canscora Lam., 121.
  decussata (Roxb.) R. & S., 122.
  macrocalyx Miq., 121.
CAPCO, SANTIAGO R. The Philippine species of Parabolocratus (Cicadellidæ, Homoptera), 325.
Capella galinago megala (Swinh.), 266.
Capsicum annum Linn. var. grossum Sendt., 223.
  frutescens Linn., 223.
Cardiospermum halicacabum Linn., 248.
Carica papaya Linn., 223.
Carterispongia radiata Hyatt, 510, 530.
Cassumunar ginger, 25.
Catimbium Juss. emend. Holtt., 4, 11.
  key to the species of, 12.
  muticum (Roxb.) Holtt., 12.
  speciosum (Wendl.) Holtt., 13.
Caulerpa brachypus Harv., 435.
  clavifera Dick., 437.
  crassifolia (C. Ag.) J. Ag., 436.
  cupressoides var. disticha Web.-van Bos., 436.
  fastigiata Mont., 436.
  Freycinettii Web.-van Bos., 440.
  laetevirens Pic., 438.
  lentillifera J. Ag., 436.
  parvifolia Harv., 437.
  peltata Gilb., 439.
  plumaris Mont., 441.
  racemosa var. chemmitzia (Esp.) Web.-van Bos., 437.
  racemosa var. clavifera (Turn.) Web.-van Bos., 437.
  racemosa var. corynephora (Mont.) Web.-van Bos., 438.
  racemosa var. gracilis (Mont.) Web.-van Bos., 438.
  racemosa var. laetevirens (Mont.) Web.-van Bos., 438.
  racemosa var. lamourouxii (Turn.) Web.-van Bos., 438.
  racemosa var. macra Web. van Bos., 439.
  racemosa var. macrophysa (Kütz.) Tayl., 439.
  racemosa var. peltata (Lam.) Eub., 439.
  racemosa var. uvifera (Turn.) Web.-van Bos., 440.
  selago (Turn.) C. Ag., 440.
  serrulata (Forssk.) J. Ag., 440.
  serrulata var. Boryana f. longifolia Gilb., 441.
  serrulata var. Boryana f. occidentalis (Web.-van Bos.) Gilb., 441.
  serrulata var. typica f. lata (Web.-van Bos.) Tseng, 440.
  serrulata var. typica f. serrulata (Forssk.) Gilb., 440.
  sertularioides (Gmel.) Howe, 441.
  sertularioides f. brevipes (J. Ag.) Sved., 441.
  sertularioides f. longiseta (Bory) Sved., 441.
  taxifolia (Vohl) C. Ag., 441.
  verticullata J. Ag., 442.
Caulerpaceæ, 335.
Celery, 223.

Chaetomorpha antennina (Bory) Kütz., 430.
  brachygona Harv., 430.
  crassa (C. Ag.) Kütz., 431.
  gracilis Kütz., 432.
  inflata Kütz., 432.
  kellersii Howe, 432.
  linum (Müll) Kütz., 432.
  torta (Fari.) McClat., 433.
Cham-poi, 247.
Chauvinia clavifera Mart., 437.
Chlorodesmis comosa Bail. & Harv., 442.
  formosana Yam., 442.
  hildebrandtii A. & E. S. Gepp, 442.
Chlorophyta, 414.
Chrysanthemum coronarium Linn., 224.
Chrysopinæ, 284.
Chrysopini, 282, 283, 306.
Chrysops Meig., 279, 280, 283, 285, 315–320.
  croceus Ség., 315.
  divisa Walk., 320.
  fasciatipennis Szil., 319.
  fascipennis (Krob.) Philip and Mack., 319.
  flavescens, 320.
  grandis (Szil.) 281, 283, 320.
  hirsuticalla Philip, 320.
  longicornis Macq., 281, 320.
  silviaris Philip and Mack., *321*.
Cinnamomum mercadoi Vid., 247.
  zeylanicum Blm., 247.
Cladophora aokii Yam., 429.
  fascicularis (Mart.) Kütz., 429.
  fuliginosa Kütz., 429.
  mauritiana Kütz., 429.
  pellucida (Huds.) Kütz., 429.
Cladophoraceæ, 413, 429.
Cladophoropsis sundanensis Reinb., 424.
Clarias batrachus (Linn.), 264.
Clathria *basilana* Levi, *510*, 520.
Clinostomum abdoni Tub. and Gar., 263, 271.
  complanatum (Rud.), 270, 271, 274.
  crysichthys Dub., 270.
  dictyotum, 270.
  intermedialis Lam., 272, 274.
  marginatum (Rud.), 270, 271.
  piscidium Southw., 270.
  reticulata (Looss) Dollf., 270.
Clinostomidæ, 263.
Clinostomum abdoni Tub. and Gar., 263, 271.
  chrysichthys Dub., 269.
  dalagi, 263, 264, 270, 271.
  dictyotum (Mont.), 270.
  macrocosm Jaisw., 274.
  ophicephali, 264, 270, 271.
  phalacrocoracis Dub., 269.
  philippinensis Vel., *265*, *269*, *271*, 274.
  pseudoheterostomum Tub., 263.
Closed spiral ginger, 38.
Cocos nucifera Linn., 248.
Codiaceæ, 442.
Codium adhaerens (Cabr.) C. Ag., 442.
  bartletii Ts. & Gilb., 442.
  contractum Kjell., 442.
  coronatum Setch., 442.
  dichotomum (Huds.) S. F. Gray, 442.
  difforme Kütz., 443.
  elongatum C. Ag., 443.
  geppii Schm., 443.
  intricatum Okam., 443.
  ovale Zanard., 443.
  papillatum Ts., & Gilb., 443.
  tenue Kütz., 443.
  tomentosum Mont., 442.
Colocasia esculentum (Linn.) Schott & Endl., 223.
Corchorus capsularis Linn., 248.
  olitorius Linn., 223.
Coriandrum sativum Linn., 224.
Cornufer meyeri (Gunt.), 340, 343.
Costus Linn., 5, 33.
  arabicus Aubl., 38.
  key to the species of, 33.
  luteus Blco., 18.
  malortieanus Wendl., 33.
  nepalensis Rosc., 36.
  nigricans Blco., 18.
  quintus Roem. et Schult., 38.
  speciosus (Koen.) Sm., 33, 35.
Cryptolabis (Bacoura) distans (Brun.), 178.
  (Bacoura) *subnebula* Alex., *178*.
Cucumis sativus Linn., 223.
Cucurbita maxima Duches., 223.
Curcuma Linn., 4, 17.
  domestica Valet., 18, 19.
  key to the species of, 18.
  longa Koem., 20.
  xanthoriza Naves, 20.
  zedoaria (Berg.) Rosc., 18.
  zerumbet Roxb., 18.
Cymopolia van-Bosseæ Solms-Laub., 433.
Cystodictyon leclancherii Gray, 427.

D

Dap-ays, 128.
Dasycladaceæ, 433.
Dasycompsa, 306.
Dichonema erectum Berk., 442.
Dicranota (Dicranota) bimaculata Schum., 163.
  (Dicranota) gurini Zett., 163.
  (Dicranota) *longisector* Alex., *162*.
  (Rhaphidolabina) spectralis (Brun.), 169.
  (Rhaphidolabina) *subspectralis* Alex., *168*.
  (Rhaphidolabis) furcistyla Alex., 163.
  (Rhaphidolabis) *hoplomera* Alex., *164*.
  (Rhaphidolabis) *obesistyla* Alex., *165*.
  (Rhaphidolabis) sordida (Brun.), 168.
  (Rhaphidolabis) subsordida Alex., 168.
  (Rhaphidolabis) *tumidosa* Alex., *167*.
Dictyosphaeria cavernosa (Forssk.) Borg., 417.

flavulosa Dick., 417.
setchelii Borg., 418.
Dilao, 20.
Dimerocostus O. Ktze., 5, 30.
strobilaceus O. Ktze., 31.
Dimerocostus uniflorus (Peopp.) K. Schum., 31.
DIOKNO, NATIVIDAD C., *see* MASILUÑGAN, DIOKNO, and QUISUMBING.
Dioscorea alata Linn., 224.
Disol, 22.
Distomum reticulatum Looss, 270.
Dolichopeza nesopeza angusta Edw., 139.
(Nesopeza) angustaxillaris Alex., 139.
(Nesopeza) *angustissima* Alex., *137*.
(Nesopeza) annulitarsis Alex., 139.
(Nesopeza) bagobo Alex., 139.
(Nesopeza) bicornigera Alex., 139.
(Nesopeza) cinctitarsis Alex., 139.
(Nesopeza) cuneata Edw., 137–139.
(Nesopeza) inornatipes Alex., 139.
(Nesopeza) quadrifila Alex., 139.
(Nesopeza) ridibunda Alex., 139.
(Nesopeza) sandakanensis Edw., 139.
(Nesopeza) subcuneata Alex., 139.
Doso, 22.
Doto, 22.
Drynaria quercifolia (Linn.) J. Sm., 248.
Dulau, 20.
Duso, 22.
Dusog, 22.
Dusol, 22.

E

Echinodictyum asperum (Ridl. et Dend.), 510, 524.
Ecionemia bacillifera (Cart.), 510.
Elettaria speciosa Blm., 29.
Emilia sanchifolia (Linn.) DC, 248.
Enteromorpha crinita (Roth), J. Ag., 414.
erecta (Lyngb.) J. Ag., 414.
flexuosa (Wulf.) J. Ag., 414.
intestinalis (L.) Link, 415.
lingulata J. Ag., 415.
plumosa Kütz., 415.
prolifera (Muell.) J. Ag., 415.
tubulosa Kütz., 415.
Erioptera (Erioptera) halterata Brun., 180.
(Erioptera) *subhalterata* Alex., *178*.
Eriopterini, 173.
Euclinostomum multicaecum Tub. & Masl., 263, 272, 273.
Eucompsa End., 284, 299.
aureocincta End., 300.
tecticallosa Sch. Stk., 301.
Eustrephus latifolius R. Br. ex Sims, 122.

F

Ficus elastica Roxb., 246, 247.
Flacourtia indica (Murm. f.) Merr., 247, 249.
Fleminga strobilifera (Linn.) R. Br., 248.
FORSBERG, VIVIAN, *see* LINDQUIST, FORSBERG, and HEALEY.
Freycinetia Villalobosensis Mart. ex Kaneh., 403.
Villalobosii Mart. emend. St. John, 403

G

Gabi, 223.
Gallinula chloropus lozanoi Lletg., 266.
Ganda, 19.
Gandasuli, 7.
Garlic, 247.
Garuga abilo (Blco.) Merr., 247.
Gastroxides Saund., 283, 384, 301, 302.
ater (Saund.), 301.
atterimus Schum., 302, 321.
fuscus Schuur., 290.
shirakii Ouchi, 301.
(Atricinctus), 302.
GATUE, LEONARDO G. TAN, *see* BUÑAG, RICOR, GAGUE, REOTUTAR, and GUEVARA.
Geitonoplesium A. Cunn., 122.
cymosum (R. Br.) A. Cunn., 122.
Gellius ridleyi Hents., 510, 525.
Gengibre, 24.
Gentianaceæ, 121.
GILBERT, WILLIAM J. An annotated checklist of Philippine marine Chlorophyta, 413.
Ginger, 24.
Gisol, 22.
Gisol na bilog, 23.
Globba Linn., 4, 5.
barthei Gangep., 6.
ectobolus K. Schum., 6.
heterobracteata K. Schum., 6.
marantina Linn., 5.
Glikway-glikug gued, 257, 261.
Glikway glumawag, 261.
Glikway lakwis, 261.
Glinus oppositifolius (Linn.) DC, 223.
Glycine max (Linn.) Merr., 223.
Gnetum gnemon Linn., 223.
Gnophomyia (Gnophomyia) anaphora Alex., 176.
(Gnophomyia) nebulicincta Alex., 176.
Gonomyia (Idiocera) thaiicola Alex., 177.
(Protogonomyia) namtokensis Alex., .77.
Gossamphynus heptaphylla, 246.
Gossampinus heptaphylla (Houtt.) Bakh., 247.
Gracilaria sp., 247.
Granada, 247.
Gressittia Philip and Mack., 279, 281, 283, *284*, 290, 300, 321.
apicalis Philip and Mack., *292, 298, 321*
aterrima (Sch. Stk.) Philip and Mack, *294, 295*.

birumis Philip and Mack., *281*, *291–295*, 296, 297, *321*.
flava Philip and Mack., *292*, 297, 298, 321.
fusca (Sch. Stk.) Philip and Mack., *295*, 296, 298.
media Philip and Mack., *291*, 295, 298.
nepalensis Philip and Mack., 281, *292–294*, *321*.
pulchripennis (Aust.) Philip and Mack., 281, *292–294*.
GUEVARA, ROMULO, *see* BUÑAG, RIGOR, GATUE, REOTUTAR, and GUEVARA.
Guillainia purpurata Viell., 15.
Gulaman, 247.

H

Hairy costus, 33.
Haliclona (Reniclona) *subcapitata* Levi, *510*, 527.
zamboangae Levi, *510*, 527.
Halicoryne Wrightii Harv., 433.
Halimeda discoidea Dec., 443.
discoidea f. intermedia Gilb., 443.
discoidea f. subdigitata Gilb., 443.
discoidea f. typica Howe ex Borg., 443.
gracilis Harv. & J. Ag., 443.
incrassata (Ell.) Lam., 444.
incrassata f. lamourouxii J. Ag., 444.
macroloba Dec., 443.
micronesica Yam., 444.
monile (Ell. & Sol.) Lam., 443.
opuntia Linn., 443.
opuntia f. cordata (J. Ag.) Bart., 444.
opuntia f. hederacea Bart., 444.
opuntia f. intermedia Yam., 444.
opuntia f. typica Bart., 444.
opuntia f. opuntia Linn., 444.
opuntia f. renchii (Hauch) Bart., 444.
orientalis Gilb., 444.
tridens f. lamourouxii (J. Ag.) Gilb., 444.
tridens f. typica (Bart.) Coll., 444.
tuna (Ell. & Sol.) Lam., 444.
tuna f. platydiaca (Dec.) Bart., 444.
HEALEY, ALAN, *see* LINDQUIST, FORSBERG, and HEALEY.
Hecalinæ, 326.
Hecalini, 326.
Hecalus kirschboumii Stål, 327.
Hedychium Koen., 4, 6.
coronarium Koen., 7.
Gardnerianum Ros., 7, 8.
key to the species of, 7.
lingulatum Hassk., 7.
pallidum Reg., 8.
philippinense, 7.
(Helius) *euryphallus* Alex., *156*, 157.
(Helius) ferruginosus (Brun.), 158, 159.
(Helius) *murreensis* Alex., *158*.
(Helius) obliteratus Alex., 156, 158.
Hellenia gracilis Hassk., 11.
Hexatomini, 169.
Hibiscus esculentus Linn., 223.
esculentus sensu Lour., 260.
japonicus Miq., 260.
manihot Linn., 260.
manihot var. palmatus DC, 260.
manihot var. typicus Hockr., 260.
notho-manihot F.v.M., 261.
palmatus Cavan., 260.
Himbabau alleanthus luzonicus (Blco.) F. Vill., 223.
Hinea praestabilis (Grunb.), 302.
rodhaini (Beq.), 302.
Hippospongia fistulosa (Lendenf.), 510, 529.
Hircinia dendroides (Polej.), 510, 531.
Hito, 264.
Hoang souc quei, 260.
Homaxinella *acanthelloides* Levi, *510*.
domantayi Levi, *510*, *515*.
Hopea acuminata, 43.
Horizontal resurrection ginger, 22.
Hybomitra, 283.

I

Ichnodonax kapne Levi, *520*.
(Histoderma) vesiculatum Dendy, 520.
Indian rubber tree, 247.
Iotrochota baculifera Ridl., 510, 518.
Ipomoea aquatica Forsk., 223.
batatas (Linn.) Poir., 223.
Ixobrychus cinnamoneus Gmel., 267, 272.
Ixora chinensis, 248.

J

JULIANO, JOSE O. The excited states of Gadolinium-155, 81; An iron-free beta-ray spectrometer for electron-electron coincidences, 185; The atomic weights of iron-52 and manganese-52m, 217.
JULIANO, JOSE O., RAMON DE LA PEÑA, and LETICIA BONOAN. A study of the gamma-ray shielding properties of some Philippine materials, 397.

K

Kaempferia Linn., 4, 21.
galanga Linn., 21, 22.
humilis Salisb., 22.
key to the species of, 21.
plantaginifolia Salisb., 22.
rotunda Linn., 21, 23.
sissilis Koen., 22.
vericolor Salisb., 23.
Kain, 130, 131.
Kalabaga, 20.
Kalabasa, 223.
Kalamismis, 223.

Kalanchoe laciniata (Linn.) DC, 248.
Kalantas, 43, 46.
Kalauag, 20.
Kálgo, 128, 130.
Kalingag, 247.
Kalophyrynus pleurostigma pleurostigma Tsch., 342, 343.
Kalumbibit, 247.
Kamatis, 223.
Kamia, 7.
Kamias, 223, 224.
Kamote, 223.
Kamoteng-kahoi, 223.
Kangkong, 223.
Katakataka, 248.
Katkatan, 7, 11.
Katotang, 7, 11.
Katuray, 223.
Kauayan tinik, 223.
Kawayan, 248.
Kawayan kiling, 248.
Kinamboi, 20.
Kinchai, Tsina, 223.
Kisol, 22.
Kleineana End., 320, 321.
Koles, 223.
Kolitis, 222–224.
Kolowratia Presl, 4, 10.
  elegans Presl, 10.
Kondol, 248.
Konik, 19.
Koniko, 19.
Kosol, 22.
Kuchai, 223.
Kulalo, 20.
Kulyau, 20.
Kunig, 20.
Kunik, 20.
Kusol, 22.

L

Labanos, 223.
Lagerstroemia speciosa (Linn.), 355.
Lactuca sativa Linn., 223, 248.
Lagikway, 257, 261.
Lagikway baniwayon, 261.
Lagikway malaguhon, 257, 261.
Lagtang, 248.
Lagunding-dagat, 248.
Laial, 24.
Laiya, 24.
Lampoyang, 19.
Lampuyang, 20.
Langkuas, 19, 27.
  mutica (Roxb.) Dege., 12.
  speciosa (Wendl.) Merr., 13.
Lankauas na pula, 13.
Lapság, 131.
Lauag, 20.
Laya, 24.
Layenaria leucantha (Duch.) Rus., 224.
Leek, 223.
Legleg, 131.
LEON, ANTONIO J. DE. The use of Philippine woods in aircraft construction, 41.
Letsugas, 223.
Lettuce, 248.
Leucosyke capitellata (Poir.) Wed., 247.
LEVI, CLAUDE. Spongiares des iles Philippines, principalment recoltees au voisinage de Zamboanga, 509.
Licuala spinosa Wurmb., 247.
Liliaceæ, 122.
Limnophilia (Elaeophila) bicolorata Alex., 173.
Limonia longivena (Edw.), 149.
  (Dicranomyia) bhutanica Alex., 155.
  (Dicranomyia) emodi Alex., 152.
  (Dicranomyia) goana Alex., 155.
  (Dicranomyia) innocua Alex., 155.
  (Dicranomyia) nigrithorax (Brun.), 152, 154.
  (Dicranomyia) *rudra* Alex., *154*.
  (Geranomyia) feuerborni Alex., 155, 156.
  (Geranomyia) *ganesa* Alex., *155*, 156.
  (Libnotes) notata (van der Wulp), 152.
  (Libnotes) notata *sicca* Alex., *152*.
  (Libnotes) *subamatrix* Alex., *151*.
  (Libnotes) thyestes Alex., 152.
  (Limonia) dravidica Alex., 148.
  (Limonia) erichtho Alex., 149.
  (Limonia) latiflava Alex., 149.
  (Limonia) micropyga Alex., 146.
  (Limonia) *parvistylata* Alex., *146*, *149*.
  (Limonia) perdocta Alex., 148.
  (Limonia) *sielediva* Alex., *148*, 149.
  (Limonia) tagax Alex., 150.
  (Limonia) vajra Alex., 150.
Limoniinæ, 146.
Limoniini, 146.
Linabí, 131.
LINDQUIST, ALICE, VIVIAN FORSBERG, and ALAN HEALEY. The phonemes of Tagabili, 225.
Linga, 248.
Linóto, 130.
Lissodendoryx Tops., 518.
Luffa cylindrica M. Roem., 223.
Luya, 24, 223, 248.
Luya-luyahan, 19.
Luyag sa-sulug, 27.
Luyan-luyaan, 6.
Luyang-dilau, 20.
Luyang-osiu, 27.
Luzuriaga cymosa R. Br., 122.
Lycopersicum esculentum Mill., 223.

M

MACKERRAS, I. M., *see* Philip and Mackerras.
Magapó, 130.
Makahiyang-lalaki, 248.

Maluñggay, 222, 223.
Mañgga, 223.
Manggachapui, 43, 46.
Mangifera indica Linn., 223.
Manihot utilissima Linn., 103.
MASILUÑGAN, VICTORIA A., NATIVIDAD C. DIOKNO, and VIRGINIA B. QUISUMBING. Screening of Philippine medicinal plants used in the treatment of tuberculosis for substances inhibitory to mycobacterium tuberculosis, 607, 245.
Mayapis, 42, 46.
Megophrys hasselti (Müller), 337, 343.
  monticola stejnegeri (Tayl.), 338, 343.
Melissomorpha Ric., 284, 306.
  indiana Ric., 306.
MENDOZA, DEMETRIO R. Lagikway—a hitherto unrecorded Philippine plant, 257.
Merycomyia, 281, 282, 287.
  haitiensis Stone, 285, 287.
Mesomyia, 281, 282, 285, 300.
  (Pareucompsa), 299.
  (Parisilvius), 294.
  (Pronopes) flavipes Hine, 285, 288.
  (Pseudotabanus), 299.
Microdictyon clathratum Mart., 427.
  montagnei Harv., 421, 423, 424.
Molophilus (Molophilus) *diversilobus* Alex., *180*, *181*, 182.
  (Molophilus) extensilebus Alex., *181*, 182.
Momordica charantia Linn., 223.
Mongo, 223.
Monostroma nitidum Wittr., 415.
MONSERRAT, CARLOS, and AMPARO BUENAVENTURA. Pulmonary paragonimiasis in the Philippines: Report of a case discovered at autopsy with paragonimum and Schistosoma lesions, 363.
Morinda citrifolia Linn., 247.
  oleifera Lam., 223.
Morus alba Linn., 248.
Mulberry, 248.
Musa errans (Blco.) Teod. var. Botoan Teod., 247.
  sapientum Linn. var. compressa (Blco.) Teod., 223.
Mustasa, 223.
Mycobacterium tuberculosis 607, 245–250.
Myrica rubra S. and Z., 247.

N

Nasturtium officinale R. Br., 248.
Neochrysops grandis Szil., 320.
Neomeris annulata Dick., 434.
  van-bosseae Howe, 434,
Neosilvius Philip and Mack., 283, *310*, 321.
Nicolaia Hor., 4, 28.
  speciosa (Blm.) Hor., 29.
Niyog, 248.
Nycticorax caledonicus manillensis Vig., 266, 272.
  nycticorax (Linn.), 266, 272.

O

Okra, 223.
Olasiman, 222, 223.
Ooeidozya laevis laevis (Günt.), 339, 343.
Ophicephlus striatus Bloch, 263–265, 270, 272, 274.
Orimarga (Orimarga) sherpa Alex., 160.
Otóp, 130.

P

Paayap, 223.
Pachyrrhizus erosus (Linn.) Urb., 224.
Paco, 248.
Pakó, 223.
Palosapis, 43, 46.
Pangas, 20.
Pangeódan, 130.
Pano-ódan, 130.
Papaya, 223.
Parabolocratus Fieb., 325, 326.
  antipolanus Philip and Mack., 327, *329*.
  arcuatus Motsch., 327, 330.
  glacusescens Fieb., 326.
  key to the Philippine species of, 326.
  merinoi Philip and Mack., 327, 333.
  porrectus (Walk.) Dist., 327, 331, 334.
  rusticus Dist., 327, 332, 333.
Paradelphomyia (Oxyrhiza) flavenscens (Brun.), 171.
  (Oxyrhiza) *dissita* Alex., *170*, 171.
  (Oxyrhiza) newar Alex., 171.
  (Oxyrhiza) nubifera Alex., 172.
  (Oxyrhiza) prayooni Alex., 172.
Paragonimus westermanii, 61, 363, 365, 368.
Parameria laevigata (A. Juss.) Molden., 248.
Paramyxilla infrequens (Cart.), 518.
Pararaphyoxya Burt., 510.
Parathelphusa (Barythelphusa) grapsoides, 62, 364.
  (Barythelphusa) mistio, 364.
Pareucompsa, 299.
Parol-parolan, 248.
Pasau-na-haba, 222, 223.
Patatas, 223.
Patola, 223.
Patutan, 247.
Payang-payang, 248.
PAYUMO, ESTELITA MORENO. The oxalic acid content of some Philippine food plants, 221.
Pedicia (Tricyphona) *biietigeri* Alex., *161*.
  (Tricyphona) insulana (Alex.), 162.
  (Tricyphona) schummeli (Edw.), 162.
  (Tricyphona) unicolor (Schum.), 162.

- Pelophryne brevipes, 344.
  - lighti (Tayl.), 338, 343, 344.
- PEÑA, RAMON DE LA, *see* JULIANO, DE LA PEÑA, and BONOAN.
- Pentacme contorta Merr. and Wolf., 42.
- Pepino, 223.
- Pericoma Walk., 463.
  - *canisquamata* Tok., *463*, *475*.
  - *decoricornis* Tok., *463*, *470*.
  - denticulatistyleta Tok. et Ets., 463.
  - furcastyla Tok., et Ets., 463, 464.
  - *itoi* Tok., *468*, *479*.
  - longicellata Tok. et Ets., 464.
  - omogoensis Tok. et Ets., 463, 464, 468.
  - reticulatipennis Tok. et Ets., 464, 485.
  - sasakawai Tok. et Ets., 463, 464.
  - shikokuensis Tok. et Ets., 464, 483.
  - *spinicornis* Tok., *463*, *473*.
  - *subnubilis* Tok., *464*, *486*.
  - yanoi Tok. et Est., 463, 464, 478.
- Petrosia similis Ridl. et Dend., 510, 528.
- Petsai, 223.
- Petsai, Tsina, 223.
- Phacomeria imperialis Lindl., 29.
  - magnifica K. Schum., 29.
- Phakellia Bow., 516.
  - *atypica* Levi, *510*, 516.
- Phalaenopsis schilleriana Reich. f., 248.
- Phaseolus aureus Roxb., 223.
  - vulgaris Linn., 223.
- Philautus acutirostris (Pet.) 341–344.
- PHILIP, C. B., and I. M. MACKERRAS. On Asiatic and related Chrysopinæ (Diptera: Tabanidæ), 279.
- Phlebotominæ, 453.
- Phloeodictyon singaporense Cart., 519.
- Phyllospongia *ectoscula* Levi, *510*, 530.
  - papyraceæ (Esp.), 430.
- Pisun sativum Linn., 224.
- Platymetopius (Thomsonia), 327.
- Polyphysa spicata Dick., 434.
- Portulaca oleracea Linn., 223.
- Premna odorata Blco., 247.
- Pronopes Loew, 285.
  - flavipes Hine, 289.
- Pseudolimnophila ernestina Alex., 172.
- Pseudotabanus, 299, 300.
- Psophocarpus tetragonolobus (Linn.) DC, 223.
- Psychodinæ, 454.
- Psycoda Latr., 454.
  - erecta Curr., 490.
  - snowii Hase., 490.
- Psylochrysops Szil., 320, 321.
- Punica granatum Linn., 246, 247.

Q

- QUISUMBING, VIRGINIA B., *see* MASILUÑGAN, DIOKNO, and QUISUMBING.

R

- RABOR, DIOSCORO S., and ANGEL C. ALCALA. Notes on a collection of amphibians from Mindanao Island, Philippines, 335.
- Rallus rallus philippinensis (Linn.,), 266.
- Rana magna Stej., 263.
  - magna magna Stejn., 340, 343.
  - micrixalus, 399, 344.
  - parva Tayl., 337, 339, 343, 344.
  - signata grandocula Tayl., 339, 343.
- Raphanus sativus Linn., 223.
- Red ginger, 16.
- Red lauan, 42, 46.
- Remolatsa, 223.
- Renealmia exaltata Blco., 11.
  - gracilis Blco., 10.
  - nutans Andr., 13.
  - mutica Salisb., 12.
- REOTUTAR, WILLIAM R., *see* BUÑAG, RIGOR, GATUE, REOTUTAR, and GUEVARA.
- Repollo, 223.
- REYES, AURORA T., *see* TUASON and REYES.
- Rhacophorus emembranatus Ing., 341, 344.
  - lissobrachius Ing., 341, 343, 344.
  - surdus (Pet.), 337, 340, 341, 343, 344.
- Rhaphidophus erectus, 524.
  - ridleyi, 524.
- Rhinomyza, Wied., 284, 301–303, 306, 321.
  - atricincta (Sch. Stk.), 303, 306.
  - fusca Oldr. 305, 306.
  - fusca Wied., 279, 280, 303.
  - *oculata* Philip and Mack., *305*, 306, 321.
- Rhinomyzini, 291, 301.
- Rhizochalina singaporensis (Cart.), 518.
- Rhizoclonium kerneri Stockm., 430.
  - kochianum Kütz., 430.
  - setaceum Kütz., 430.
- RIGOR, BENJAMIN M., *see* BUÑAG, RIGOR, GATUE, REOTUTAR, and GUEVARA.
- Roripa nasturtium aquaticum Hayek., 224.
- Roscoe nigro-ciliata Hassk., 18.

S

- Saga, 248.
- Saging, 223.
- ST. JOHN, HAROLD. Note on a Micronesian species of Freycinetia (Pandanaceæ). Pacific plant studies, XVII, 403.
- Salampauyan, 20.
- Salbak, 11.
- Saluyot, 248.
- Samanea saman, 249.
- Sampalok, 223.
- Sangádil, 130.

Santan-pula, 248.
SANTIAGO, DOMINGO. Malaria control by automatic flushing of streams, 373.
Sarsalida, 223, 224.
Sayote, 223.
Schistosoma japonicum, 363, 367, 368.
Schizostachyum lumampao (Blco.) Merr., 325.
Sechium edule Sw., 223.
Selaginella braunii Bak., 351.
  caulescens Spr., 345–348, 351.
  martensii Spr., 351.
  pallescens (Presl) Spr., 345–349, 351.
  selaginoides (L.) Link, 351.
  spinosa, 350.
  uncinata Spr., 351.
  viticulosa Klotz., 345–349, 351.
  vogelli Spr., 345, 346, 348, 349, 351.
Sengá, 130, 131.
Sesamum orientale Linn., 248.
Sesbania grandiflora (Linn.) Pers., 223.
Setawar, 36.
Shorea negrosensis Foxw., 42.
  polysperma Merr., 42.
  squamata Merr., 42.
Sibuyas, 223, 248.
Siempreviva, 248.
Sile, 223.
Sile leaves, 222.
Sileng-bilog, 223.
Silviochrysops flavescens Szil., 319, 320.
Silviomyza Philip and Mack., 283, 285, 307,
Silvius Meig., 281-284, 309, 313, 318, 321.
  ceylonicus Szil., 282, 310, 316.
  coquiletti Krob., 317.
  dorsalis Coq., 306, 310, 315–318.
  fascipennis Krob., 319.
  formosiensis Ric., 310, 311, 321.
  indianus Ric., 310, 315, 316.
  matsumurai K. & T., 310, 315.
  nigripennis Ric., 316.
  nigripennis Shir., 321.
  piceus Szil., 307, 321.
  ornatus Philip and Mack., 310, 315, 316.
  shirakii Philip and Mack., 310, *321*.
  singularis (Meig.) 282, 315.
  suifui Philip and Mack., 310, *311*, 313.
  vituli, 317.
  (*Neosilvius*) Philip and Mack., 284, 310.
  (Neosilvius) formosiensis Ric., 313.
  (*Neosilvius*) *suifui* Philip and Mack., 321.
  (Silvius), 310.
  (Silvius) ceylonicus Szil., 316.
  (Silvius) dorsalis Coq., 317.
  (Silvius) indianus Ric., 315.
  (Silvius) matsumurai K. and T., 317, 320.
  (Silvius) *ornatus* Philip and Mack., 313, *321*.
Sinkamas, 224.
Siphonales, 434.
Siphonocladaceæ, 420.
Siphonoclodales, 417.
Sitau, 224.
Sitsaro, 224.
Small shell ginger, 12.
Solanum melongena Linn., 224.
  tuberosum Linn., 223.
SOLHEIM, WILLIAM G., II. Notes on burial customs in and near Sagada, Mountain Province, 123.
SOLIVEN, F. A., and E. BONECILIO. A preliminary report on the effect of pH on the rate of settling of cassava starch in aqueous suspension, 103.
Sphecodemyia, 302.
Spiral ginger, 36.
Spirastrella inconstans (Dendy), 510, 513.
Spongia officinalis Linne, 510, 528.
Spongocladia vaucheriaeformis Aresch., 424.
Staurois natator (Günt.), 340, 343.
STEENIS, C. G. G. J. VAN. Three new records for the Philippine flora, 121.
STEINER, MONA LISA. A new and illustrated flora of Manila, I. Zingiberaceæ, 1.
Stelleta *plagioreducta* Levi, *510*, 512.
Struvea delicatula Kütz., 421.
Stylostichon, 518.
Stylotella agminata (Ridl.), 510, 514.
Styracaceæ, 121.
Styringomyia caudifera Alex., 182.
Sycorax Hal., 454.
  nipponicus Tok. et Ets., 454.

T

Tabanidæ, 282.
Tabanocella, 290, 303.
Tabanocella fenestrata Séguy, 302, 303.
Tabanus amaenus, 283.
Tagbak, 11.
Tagulauali, 248.
Tagubinau, 248.
Taiwanomyia Alex., 169.
  perpendicularis Alex., 169.
  perretracta (Alex.), 169.
Talinum, 222, 224.
  triangulare Willd., 224.
Talong, 224.
Tamahiba, 19.
Tamahilan, 19.
Tamarindus indica Linn., 223.
Tamo, 19.
Tamohilang, 27.
Tamokansi, 19.
Tañgile, 42, 46.
Tañgo, 224.
Tapis, 130.
Teak, 248.

Tectona grandis Linn. f., 248–250.
Telmatoscopus Eaton, 489.
  albipunctatus Will., 490.
  frondeus Tok. et Ets., 490, 492.
  itoi Tok., 495.
  key to the Japanese species of, 489.
  kii Tok. et Ets., 489.
  lanceolatus Tok., 497.
  meridionalis Eat., 490.
  nigrescens Tok. et Ets., 490.
  spinitibialis Tok. et Ets., 490, 493.
  spinitibialis okinawanus Tok., 493.
Tenacia frondifera (Bow.), 510, 521.
  ridleyi (Lindq.), 510, 522.
Tetigonia kalidasa Kirk., 330.
Teucholabis (Teucholabis) *paraplecioides* Alex., *174*.
  (*Teucholabis*) progne Alex., 175.
  (Teucholabis) plecioides de Meij., 174, 175.
  (Teucholabis) thurmani Alex., 176.
Thaumastomyia Philip and Mack., *281*, 283–286, 321.
  haitiensis (Stone) Philip and Mack., 287, *321*.
Thomsonia Sig., 326.
Thomsoniella Sig., 325, 326.
  albomaculatus, 325, 327.
  porrectus Walk., 225, 326.
  viridis Dist., 332, 333.
Thrypticomyia Sku., 150.
Tigre, 248.
Tikala, 29.
Tinag tágo, 125.
Tipula shawiana Alex., 145.
  (Vestiplex) lepcha Alex., 144.
  (Indotipula) blandita Alex., 144.
  (Schummelia) lama Alex., 139.
  (Schummelia) notomelania Alex., 140.
  (Tipulodina) forficuloides Alex., 140.
  (Tipulodina) *malabarensis* Alex., *141*.
  (Tipulodina) subscimitar Alex., 143.
  (Tipulodina) venusta Alex., 141.
  (Tipulodina) xanthippe Alex., 142.
  (Vestiplex) gurkha Alex., 143.
Tipulinæ, 137.
Toch ginger, 29.
TOKUNAGA, MASAAKI. Japanese Psychodidæ, V. Descriptions and revisions on the Japanese species of the genera Trichopsychoda, Pericoma, Telmatoscopus, Brunettia, and Trichomyia, 453.
Toona calantas Merr. and Rolf., 43.
Torenia sp., 121.
Texochalina robusta Ridl., 510, 524.
Trentepohlia (Mongoma) *alboposticata* Alex., *173*.
  (Mongoma) bombayensis Edw., 174.
  (Mongoma) pallidiventris (Brun.), 174.
Trichomyia Hal., 454.
  itocoæ Tok. et Ets., 454.
Trichomyiinæ, 454.
Trichopsychoda Tonn., 453, 454.
  arnaudi Tok., *460*.
  key to the Japanese species of, 454.
  lepida Tok. et Ets., 455.
  okinawensis Tok., *457*.
  ozensis Tok., *454*, 456.
  shogakii Tok. et Ets., 456.
Troglophila Brun., 169.
  perpendicularis Alex., 169.
TROYER, MADELINE. Gaddang phonology, 95.
TUASON, ANGELITA M., and AURORA T. REYES. Water-soluble extract from coconut husk in leather technology, 253.
Tububungiau, 36.
Tumbong-aso, 27.
Turmeric, 20.
Tydemania expeditionis Web. van Boss., 444.

U

Uan-suy, 224.
Ubi, 224.
Udotea argentea var. spumosa A. & E. S. Gepp, 444.
  flabellum (Ell. & Sol.) Lam., 444.
  javensis (Mont.) A. & E. S. Gepp, 445.
  orientalis A. & E. S. Gepp, 445.
  sordida Mont., 442.
Ulotrichales, 414.
Ulva fasciata Deli., 415.
  intestinalis Blco., 415.
  lactuca Linn., 416.
  reticulata Forssk., 416.
Ulvaceæ, 413, 414.
Unig, 19.
Upo, 224.
Upright resurrection ginger, 23.

V

Valonia aegagropila C. Ag., 418.
  fastigiata Harv., 419.
  macrophysa Kütz., 420.
  utricularis (Roth) C. Ag., 419, 420.
Valoniaceæ, 417.
VELASQUEZ, CARMEN C. Studies on parasites of Philippine edible fishes, I. Family Clinostomidæ in Ophicephalus striatus Bloch; Clinostomum philippinensis sp. nov. with notes on the definitive hosts, 263.
Vigna sinensis (Linn.) Savi., 223.
Vitex trifolia Linn., 248.
Voloniopsis pachynema (Mart.) Börg., 428.

W

Watercress, 224, 248.
White ginger, 7.
White lauan, 42, 46.
Wild ginger, 27.

Y

Yellow India ginger, 8.
YOGORE, MARIANO G. Jr., BENJAMIN D. CABRERA, TRINITA P. ARAULLO, and ERNESTO F. CABALTEJA. Studies on paragonimiasis, VIII. On the excystation of Paragonimus metacercariæ, 61.

Z

ZAMORA, PRESCILLANO M. Anatomy of the protoxylem elements of four Selaginella species, 345.
Zedoary, 19.
Zerumbet speciosum Wendl., 13.
Zingiber Fabr., 4, 23.
  blancoi Hassk., 24.
  cassumunar Roxb., 24, 25.
  key to the species of, 24.
  officinale Rosc., 24, 223, 248-250.
  purpureum Rosc., 25.
  zerumbet (Linn.) Sm., 24, 27.
  zerumbet Sm. var. magnum Elm., 27.
Zingiberaceæ, 1–4.

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CONTENTS

No. 1, March, 1959

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Page

STEINER, MONA LISA. A new and illustrated flora of Manila, I. Zingiberaceæ 1
Three plates and seven text figures.

LEON, ANTONIO J. DE. The use of Philippine woods in aircraft construction 41
Two plates and seven text figures.

YOGORE, MARIANO G., Jr., BENJAMIN D. CABRERA, TRINITA P. ARAULLO, and ERNESTO F. CABALTEJA. Studies on paragonimiasis, VIII. On the excystation of Paragonimus metacercariæ 61
One plate and three text figures.

JULIANO, JOSE O. The excited states of Gadolinium–155 81
One text figure.

TROYER, MADELINE. Gaddang phonology 95

SOLIVEN, F. A., and E. BONECILIO. A preliminary report on the effect of pH on the rate of settling of cassava starch in aqueous suspension 103
Three text figures.

STEENIS, C. G. G. VAN. Three new records for the Philippine flora 121

SOLHEIM, WELHELM G. II. Notes on burial customs in and near Sagada, Mountain Province 123
One plate and one text figure.

No 2, June, 1959

[Issued September 12, 1960.]

ALEXANDER, CHARLES P. New or little-known Tipulidæ from eastern Asia (Diptera), XLVI 137
Five plates.

JULIANO, JOSE O. An iron-free beta-ray spectrometer for electron-electron coincidences 185
Two plates and thirteen text figures.

JULIANO, JOSE O. The atomic weights of iron–52 and manganese–52m 217
One text figure.

PAYUMO, ESTELITA MORENO. The oxalic acid content of some Philippine food plants 221

LINDQUIST, ALICE, VIVIAN FORSBERG, and ALAN HEALEY. The phonemes of Tagabili 225

Page

MASILUNGAN, VICTORIA A., NATIVIDAD C. DIOKNO, and VIRGINIA B. QUISUMBING. Screening of Philippine medicinal plants used in the treatment of tuberculosis for substances inhibitory to Mycobacterium tuberculosis 607 245

TUASON, ANGELITA M., and AURORA T. REYES. Water-soluble extract from coconut hust and its application in leather technology 253

MENDOZA, DEMETRIO R. Lagikway—a hitherto unrecorded Philippine plant 257
One text figure.

No. 3, September, 1959

[Issued June 2, 1961.]

VELASQUEZ, CARMEN C. Studies on parasites of Philippine edible fishes: I. Family Clinostomidæ in Ophicephalus striatus bloch; Clinostomum philippinensis sp. nov. with notes on the defintive hosts 263
Four plates.

PHILIP, C. B., and I. M. MACKERRAS. On Asiatic and related Chrysopinæ (Diptera: Tabanidæ) 279
One plate and seventy-one text figures.

CAPCO, SANTIAGO R. The Philippine species of Parabolocratus (Cicadellidæ, Homoptera) 325
Twenty-four text figures.

RABOR, DIOSCORO S., and ANGEL C. ALCALA. Notes on a collection of Amphibians from Mindanao Island, Philippines 335

ZAMORA, PRESCILLANO M. Anatomy of the protoxylem elements of four Selaginella species 345
Four plates.

BUÑAG, RUBEN D., BENJAMIN M. RIGOR, LEONARDO G. TAN GATUE, WILLIAM R. REOTUTAR, and ROMULO GUEVARA. The effects of hypoglycemia induced by agents other than exogenous insulin on duodenal motility in dogs under morphine-chloralose anesthesia, II. Lagerstroemia speciosa (Linn.) 355
One plate.

MONSERRAT, CARLOS, and AMPARO BUENAVENTURA. Pulmonary paragonimiasis in the Philippines 363
Four plates.

SANTIAGO, DOMINGO. Malaria control by automatic flushing of streams 373
Five text figures.

JULIANO, JOSE O., RAMON DE LA PEÑA, and LETICIA BONOAN. A study of the gamma-ray shielding properties of some Philippine materials 397
Five text figures.

ST. JOHN, HAROLD. Note on a Micronesian species of Freycinetia (Pandanaceæ). Pacific plant studies, XVII 403

BOOK REVIEWS 405

No. 4, December, 1959

[Issued September 28, 1961.]

Page

GILBERT, WILLIAM J. An annotated checklist of Philippine marine Chlorophyta 413
One plate and one text figure.

TOKUNAGA, MASAAKI. Japanese Psychodidæ, V. The genera Trichopsychoda, Pericoma, Telmatoscopus, Brunettia, and Trichomyia 453
Eighty-four text figures.

LEVI, CLAUDE. Spongiares des iles Philippines, Principalment recoltees au voisinage de Zamboanga 509
Three text figures.

BOOK REVIEWS 535

PUBLICATIONS AVAILABLE

CONTENTS AND INDEX. THE PHILIPPINE JOURNAL OF SCIENCE, vol. 1 (1906) to vol. 10 (1915). Bureau of Science Publication No. 8 (1917). Paper, 442 pages. Price, $2.00 United States currency, postage extra.

SECOND TEN-YEAR INDEX. THE PHILIPPINE JOURNAL OF SCIENCE, vol. 11 (1916) to vol. 28 (1925). Compiled by Winifred I. Kelley. Bureau of Science Monograph 26. Paper, 382 pages. Price, $2.00 United States currency, postage extra.

CHECKLIST OF THE ANTS (HYMENOPTERA: FORMICIDAE) OF ASIA. By J. W. Chapman and S. R. Capco. Institute of Science and Technology Monograph 1 (1951) new series. Paper, 327 pages. Price, $2.00 United States currency, postage extra.

NOTES ON PHILIPPINES MOSQUITOES, XVI. GENUS TRIPTEROIDES. By F. E. Baisas and Adela Ubaldo-Pagayon. Institute of Science and Technology Monograph 2 (1952) new series. Paper, 198 pages with 23 plates and 4 text figures. Price, $2.50 United States currency, postage extra.

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CONTENTS

Page

Gilbert, William J. An annotated checklist of Philippine marine Chlorophyta 413

Tokunaga, Masaaki. Japanese Psychodidæ, V. Descriptions and revisions on the Japanese species of the genera Trichopsychoda, Pericoma, Telmatoscopus, Brunettia, and Trichomyia 453

Levi, Claude. Spongiares des Iles Philippines, Principalment recoltees au voisinage de Zamboanga 509

Book Reviews 535

Index 543

PUBLICATIONS AVAILABLE—Continued

A REVISION OF THE INDO-MALAYAN FRESH-WATER FISH GENUS RASBORA. By Martin R. Brittan. Institute of Science and Technology Monograph 3 (1953) new series. Paper, 224 pages with 3 plates and 52 text figures. Price, $2.50 United States currency, postage extra.

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